Naval Research Laboratory
Washington, DC 20375-5320

NRL/MR/6110--04-8774

Isotope Ratio Mass Spectrometry Data Processing Software: Multivariate Statistical Methods for Hydrocarbon Source Identification and Comparison

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April 29, 2004

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)* 29 April 2004	**2. REPORT TYPE** Final report	**3. DATES COVERED** *(From - To)* July 2003-December 2003

4. TITLE AND SUBTITLE Isotope Ratio Mass Spectrometry Data Processing Software: Multivariate Statistical Methods for Hydrocarbon Source Identification and Comparison	**5a. CONTRACT NUMBER**
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) Thomas J. Boyd and Richard B. Coffin	**5d. PROJECT NUMBER**
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER 61-7800-G3
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Research Laboratory, Code 6114 4555 Overlook Avenue, SW Washington, DC 20375-5320	**8. PERFORMING ORGANIZATION REPORT NUMBER** NRL/MR/6110--04-8774
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Naval Sea Systems Command 1333 Isaac Hull Avenue, S.E. Washington Navy Yard, DC 20376	**10. SPONSOR / MONITOR'S ACRONYM(S)**
	11. SPONSOR / MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The IRMS Data Processing software package is designed to allow easy stable isotope data entry and multivariate data analysis. When comparing two or more hydrocarbon samples using compound-specific isotope ratio mass spectrometry, an analyst obtains multiple data variables for each sample. Multivariate statistics allows rigorous comparison(s) to determine if the samples are in fact different and if so, how closely related they are. This software uses three main types of data analyses: Multiple Analysis of Variance (MANOVA), Principal Components Analysis (PCA), and Cluster Analysis. The layout is a standard Windows interface which should be usable to anyone familiar with modern operating system software.

15. SUBJECT TERMS

Software; Stable isotope ratios; Statistical analysis; Multiple Analysis of Variance; Principal Components Analysis; Hierarchical clustering; Data table

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON** Thomas J. Boyd
a. REPORT Unclassified	**b. ABSTRACT** Unclassified	**c. THIS PAGE** Unclassified	UL	145	**19b. TELEPHONE NUMBER** *(include area code)* (202) 404-6424

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

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ISOTOPE RATIO MASS SPECTROMETRY DATA PROCESSING SOFTWARE: MULTIVARIATE STATISTICAL METHODS FOR HYDROCARBON SOURCE IDENTIFICATION AND COMPARISON

INTRODUCTION

Oil spills present a significant problem for domestic Naval operations. Annual cleanup costs approach $10M with nearly 1,600 spills totaling 255,000 gallons reported from FY97 through FY03. With these spills, the Navy is in violation of the Clean Water Act, which prohibits discharge of oil in amounts sufficient to produce a visible sheen on the water surface. Although the Navy is exempt from fines and penalties from oil spills, environmental ramifications have attracted high-level Congressional, State, and local concern. States with large Naval fleet presence such as California, Washington, Virginia and Texas have shown particular interest in Naval fuel spills. The lack of measurable progress in reducing the number and volume of spills may impact the Navy's Public Vessel Exemption, resulting in fines, penalties and remediation costs that would total in the millions annually.

In March 1999, the Naval Sea Systems Command, as directed by the CNO, prepared a Shipboard Oil Spill Prevention Initiative plan. The plan was based on actual NAVSEA Shipboard analysis and the results of a workshop held in Norfolk, VA in August 1999. The initial plan was aimed at reducing or eliminating fuel spills by applying lessons from known causes. To this end, the FUEL ID initiative was created to provide identification of spill versus non-spill oil signatures in the environment. Compound-specific carbon isotope analysis (CSIA) coupled to multivariate statistics was identified as a robust means of determining similarity between unknown spill oils and those from Naval sources.

Frequently multiple sources exist and complex mixing and transport result in uncertain assessment and organization of remedial action. A number of fingerprinting approaches have been developed to determine source and fate of hydrocarbons, the most common of which is to determine the relative concentrations of individual hydrocarbons in a mixture. The major drawback of this approach is that it does not take into account weathering activities (i.e. biological, physical) which might preferentially remove certain components of the mixture. Stable isotope analyses of elements provides the ability to identify the sources and fate in complex mixtures of environmental organic matter by targeting a concentration-independent chemical property of each contaminant in a mixture. Isotope analysis of carbon, nitrogen and sulfur pools has provided a more thorough understanding of organic matter sources and cycling in a variety of ecosystems (Peterson and Fry, 1987; Fry, 1986; Coffin and Cifuentes, 1999). Further development of isotope ratio methodology has provided the ability to identify cycling of carbon at a molecular level (Coffin et. al. 1990; Silfer et al. 1991; Meier-Augenstein, 1995; Hullar et al., 1996) allowing identification of specific microbial roles in the biogeochemical cycling of carbon and nitrogen. In addition, this approach has provided the capacity to use stable carbon isotope analysis ($\delta^{13}C$) to assist in development and interpretation of bioremediation strategies for ecosystems that are contaminated with organic chemicals (Aggarwal and Hinchee, 1991; Trust et al., 1995; Coffin et al., 1997).

The recent coupling of gas chromatography (GC) to transfer individual compounds, combusted inline, to the isotope ratio mass spectrometer (IRMS) provides a two dimensional ability to identify individual contaminant sources (e.g. Hammer et al. 1998).

Manuscript approved March 15, 2004.

Preliminary experiments demonstrate that the carbon isotope signature in 2-, 3-, 4-, 5-ring PAHs is stable to vaporization, photolytic decomposition and microbial degradation (O'Malley et al., 1994). If contaminant sources have a broad range in $\delta^{13}C$ it is possible to determine the contribution of a source to the total loading. With $\delta^{13}C$ analysis the percent of vehicular emissions and crank case oil in the total PAH loading was estimated in the St. John's Harbour, Newfoundland (O'Malley et al., 1996). In a similar study using $\delta^{13}C$ for analysis of benzene, toluene, ethylbenzene and xylene (BTEX) multiple petroleum sources were shown to be present in groundwater that was thought to be contaminated with one source (Kelley et al. 1997). Other recent research provides further support for the application of carbon isotope analysis to trace the contaminant sources. This approach has been applied in the tracking of nitroaromatic compounds (Coffin et al. 2001), PCE and TCE (Lollar et al. 2001), and jet fuels (Landmeyer et al. 1996). This research has initiated the application of carbon isotope analysis to assess organic contaminant sources in ecosystems.

GOALS

1. Develop the software to survey carbon isotope ratio data for determination of contaminant sources.
2. Initiate a stable carbon isotope facility at the Norfolk Navy Base to determine the source(s) of petroleum spills.

METHODS

This project applies the recent development in stable carbon isotope analysis to trace fuel sources at the Norfolk Navy Base. The preliminary step in this project was to use existing and contemporaneously-gathered data to develop a hydrocarbon stable carbon analysis software application. This application consists of a data entry module, data analysis module and a reporting module. The data entry module allows users to import excel data, or enter stable carbon isotope data directly into the application. A user will then be able to perform a series of statistical analysis (as described below) to determine the similarities between hydrocarbon samples. The reporting module displays and can "export" the results of the analysis for inclusion in standard documenting formats (i.e. Word®, Powerpoint®, etc). The analysis module processes data in a number of ways. One of the difficulties in interpreting data from isotope analyses is that there are more than two variables, negating a simple, direct analysis of variance. In the data entry module a series of alkanes and their $\delta^{13}C$ values will be entered. In this way, there will at least eight separate variables (i.e. C_{10}, C_{11}, C_{12}, etc) per sample. Data with multiple observations and multiple variables lends itself to multivariate analysis. In developing the analysis software module, the Matlab® multivariate statistical toolbox was used.

The first analysis is a MANOVA or multiple analysis of variance. This analysis allows one to determine if there are statistically significant differences between two samples with multiple variables. Data output from this test provides a probability that the two samples are the same. Generally, if the *P* (or probability) value is less than 0.05, there is only a 5% chance that the two samples are the same. The analysis module will allow the user to select the desired probability reporting (i.e. 5% or 1%) as a screening tool. The actual probabilities are calculated and transferred to the reporting module. Aside from determining if two sources are "different," it will also be of use to determine how similar two sources are. For instance, if two sources intermingle, the resulting mixture might be "different" from each of its parent sources; however it might be closely related to both. Principal components or factor analysis (PCA) can help an investigator determine how closely related two samples are by simplifying the factors controlling variability. By plotting the first two factors against one another, samples can be visualized based on their relatedness. Each factor is given a weighting as to how important it is in describing the variability found in the original data. Cluster analysis is another multivariate means to determine the relatedness of samples. This analysis does not try to "simplify" the variability between samples, and therefore must be interpreted in light of the cophenetic correlation coefficient (which in the case of the test data set used here was too low for acceptable results). Matlab® has a number of protocols to fine tune data for inclusion in this analysis. The reporting module collates information from the analysis module and outputs data in a report format. The output is exportable to standard formats (i.e. Word®, Powerpoint®, PDF®, etc) as well as printable on any Windows-installed printer.

The underlying statistics for the application are derived from the Matlab® computing language using the Matlab® compiler which allows Matlab® code to be converted to C/C++. Although the Matlab® environment includes a graphical user interface development module, statistical routines were exported to C++ code and compiled into dynamic libraries that were included in a program developed within the Microsoft® Visual Studio.net environment. In this manner, the "standard" Windows® interface is used for the finished product. The separate modules (data entry, data analysis, reporting) work together within an overall stand-alone Windows® application.

THE SOFTWARE

I. Introduction

The IRMS Data Processing software package (IRMS-DP) is designed to allow easy stable isotope data entry and multivariate data analysis. When comparing two or more hydrocarbon samples using compound-specific isotope ratio mass spectrometry, an analyst obtains multiple data variables for each sample. For instance with volatile samples, one may be able to separate benzene, toluene, ethyl-benzene, *p*-xylene, *o*-xylene and *m*-xylene and obtain a stable isotope ratio for each. Multivariate statistics allows rigorous comparison(s) to determine if the samples are in fact different and if so, how closely related they are.

This software uses three main types of data analyses: Multiple Analysis of Variance (MANOVA), Principal Components Analysis (PCA), and Cluster Analysis. In data sets with multiple variables, it is desirable to determine if the means of two samples are significantly different. A multiple analysis of variance (MANOVA) can be used to produce probability values. A P value of 0.01 essentially means that one can be 99%

certain that chance alone would not lead to the differences seen between sample means.

In data sets with multiple variables, groups of variables often behave similarly. More than one variable may in fact be describing the same principle of the system. PCA attempts to simplify a multivariate data set by replacing a group of variables with a single new variable, called a principal component. Each principal component is a linear combination of the original variables. The variance of each principal component is the maximum among all possible choices. The analysis provides information as to how much of the original variance is represented by each principal component. Therefore, when the primary components are graphed against one-another, data sets that are highly similar will plot together, while dissimilar data sets will occupy different spaces on a graph. The result of placing the scores in a new coordinate system allows visualizing the data.

In addition to PCA analysis, clustering analysis can be used to determine a relative 'distance' between relations in multivariate data. This would be analogous to plotting a family tree and using one inch to represent each generation of distance between progenitors and progeny. The length of vertical lines in clusters is indicative of the 'distance' of relatedness between samples.

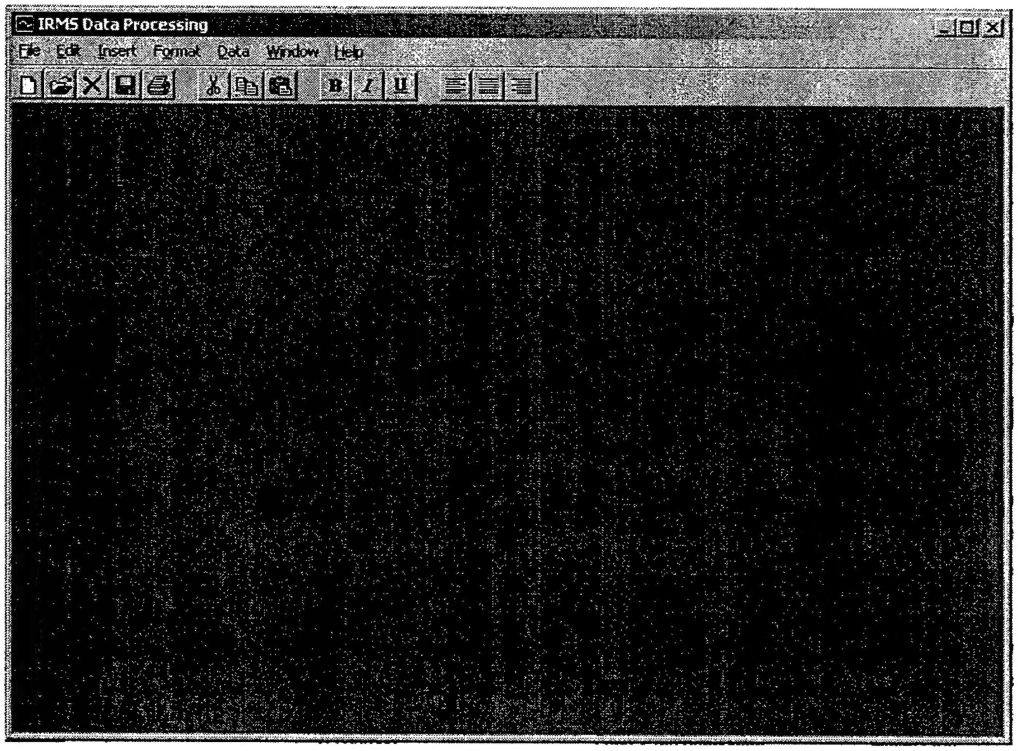
II. Program Introduction

IRMS-DP is meant to be similar to any windows spreadsheet software for data entry. Each step in data entry and subsequent analysis is menu driven allowing a "non-statistician" to use the software effectively. The user is asked how many replicates will be entered (i.e. how many replicate sample runs) and whether he/she wishes to name each variable in the data grid. Naming or not naming variables will not impact the data analysis so this feature is provided solely for the convenience of the user. Once the data grid is created, the user enters the sample name (or SampleID) for each sample and the individual stable isotope ratios for each compound (variable). These can be manually entered or pasted into the grid from a text or spreadsheet application. **One data grid should be made for each set of measurements with the same number of variables.** For example, if seven hydrocarbons (variables), such as nonane, decane, undecane, dodecane, tridecane, tetradecane, pentadecane, and hexadacane were determined for 8 samples, but in 4 samples, tetradecane was not resolvable, the 4 samples (without tetradecance) must be placed in a separate data table for analysis. **Only samples with the same number of variables can be directly compared to one another with this program's statistical techniques**.

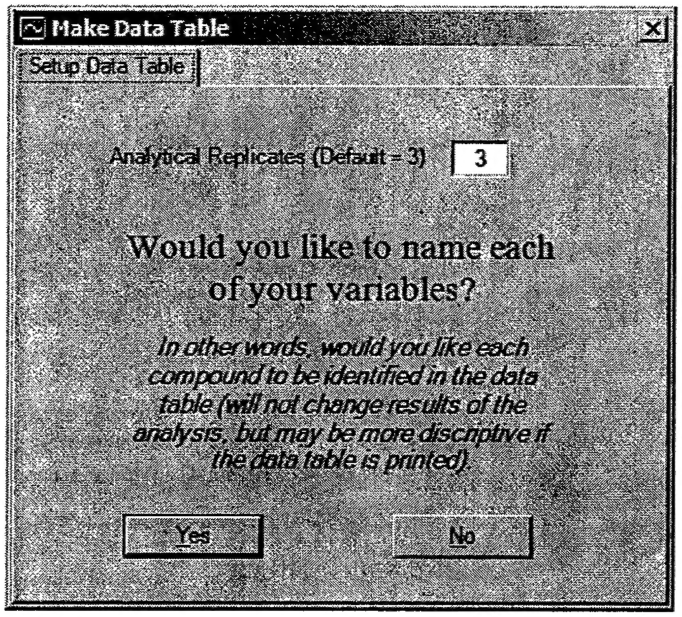
Once the data grid is complete, the user can choose any of the three main statistical tests and receive results. The results are displayed in graphs and in associated text box(s) so the user can "keep" the most useable data and results. Data, results and graphs are exportable and savable to be portable between IRMS-PD and presentation/graphics software.

III. Data Table Setup

The Data Table or Grid is the first entry step for using IRMS-DP. Upon opening the program, the user is presented with a "blank" program workspace:



The "standard" windows menus are available as well as a toolbar representing shortcuts to commonly used menu items. The first step in performing an analysis is to create or open a Data Table. Under the file menu, there is a choice for New or Open. These choices are also represented by the first two toolbar buttons. If the user chooses to create a new Data Table, he/she is presented with the following screen:

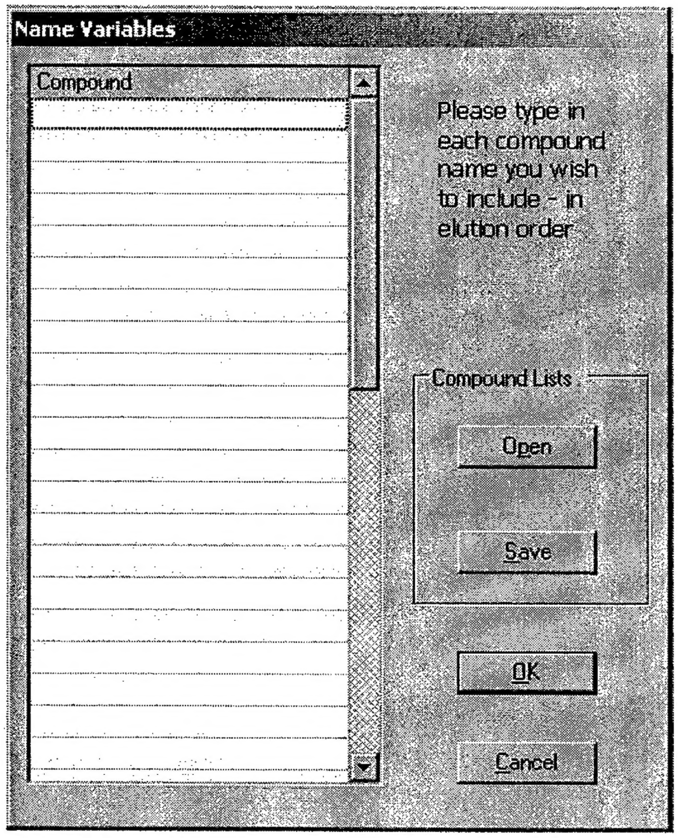


Analytical Replicates (Default = 3) 3

Would you like to name each of your variables?

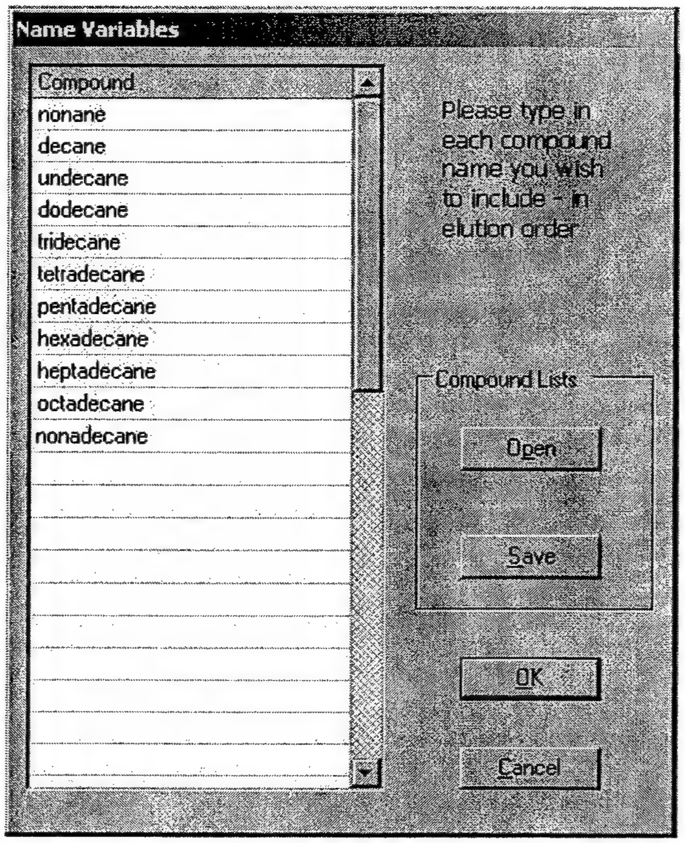
In other words, would you like each compound to be identified in the data table (will not change results of the analysis, but may be more discriptive if the data table is printed).

The Make Data Table dialog box requires the user to select the number of replicates to be entered for each sample. The default is three (3). This can be changed to any number the user wishes. However, data must be entered for all of the replicates specified. Therefore, the user should select the lowest number of replicates found in the group of samples to be analyzed. The user is also asked if he/she wishes to name the variables. This is not necessary, but makes manual data entry easier (with named column headings). If the user chooses to name variables, he/she will be provided with the following dialog box:



Please type in each compound name you wish to include - in elution order

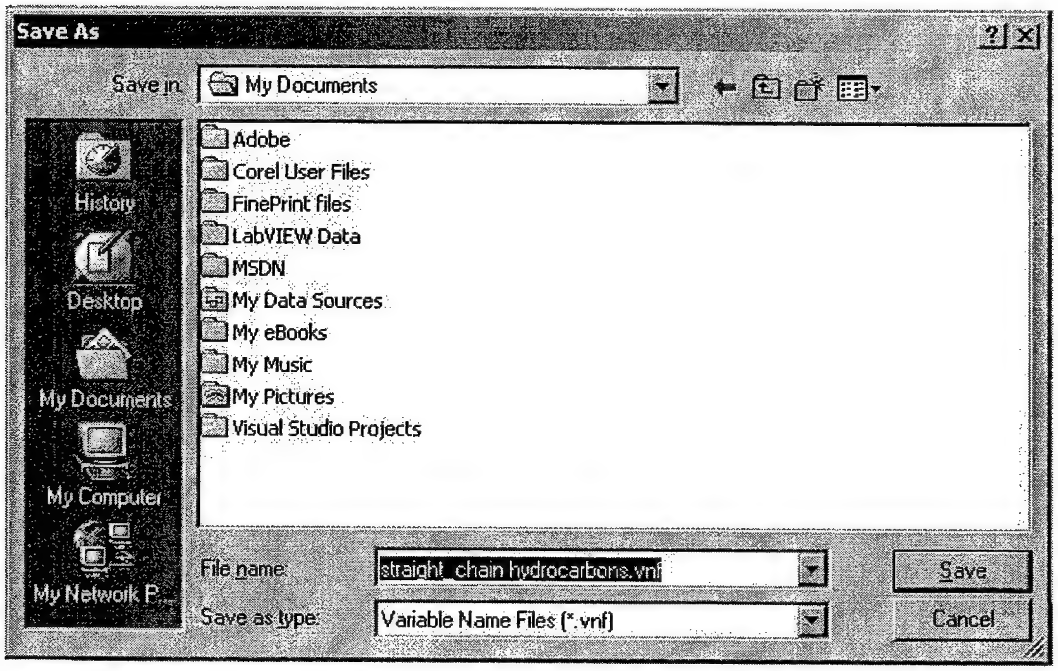
Variables (i.e. individual compounds) can be entered just as one would enter data into a spreadsheet. Once entered, the variable names can be saved to a text file for use in subsequent analyses. Alternatively, if the same compounds were used in a previous analysis and saved, the file can be opened to populate the Compound grid:


Name Variables

Compound
nonane
decane
undecane
dodecane
tridecane
tetradecane
pentadecane
hexadecane
heptadecane
octadecane
nonadecane

Please type in each compound name you wish to include - in elution order

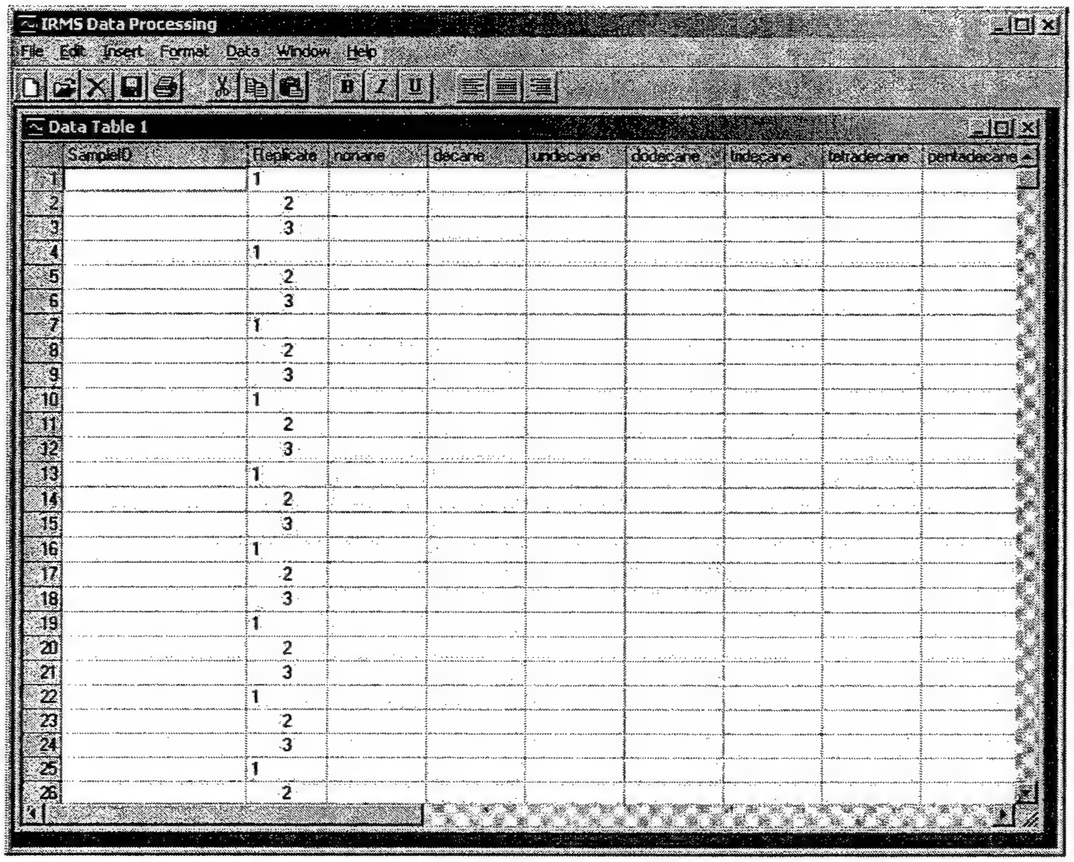
Above is listing of straight-chain hydrocarbons that can be analyzed by compound-specific isotope ratio mass spectrometry. If Save is clicked, the file can be stored for future use:



File name: straight_chain hydrocarbons.vnf

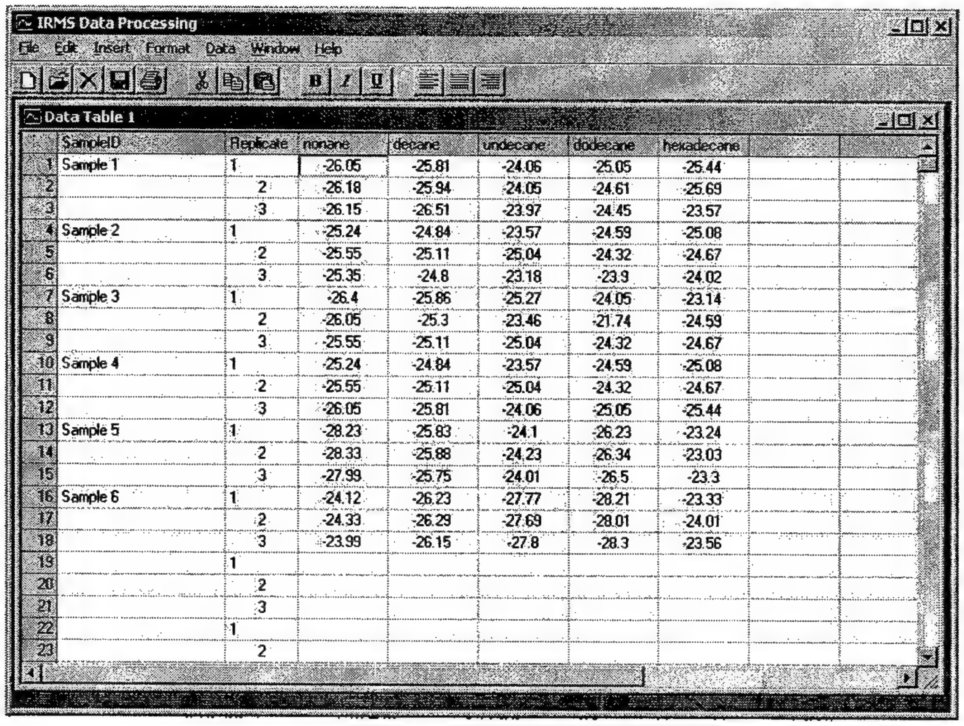
Save as type: Variable Name Files (*.vnf)

When OK is pressed (or No in the Make Table dialog box), a Data Table is created for the user:



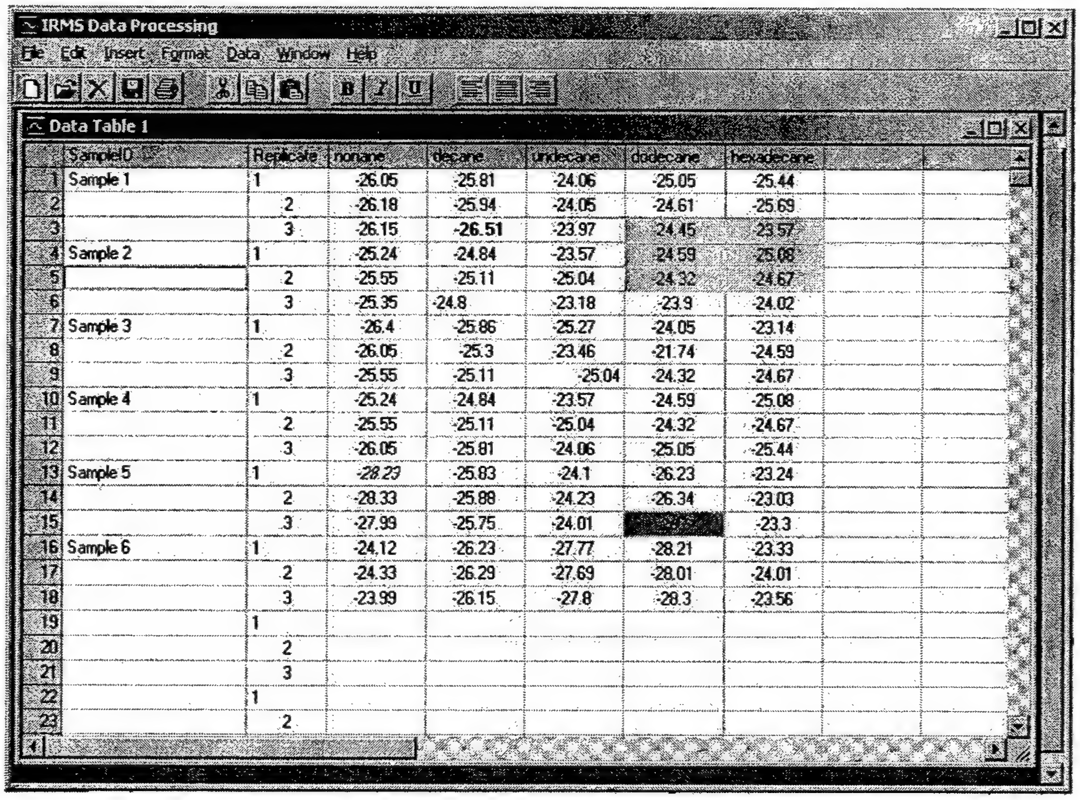
	SampleID	Replicate	nonane	decane	undecane	dodecane	tridecane	tetradecane	pentadecane
1		1							
2		2							
3		3							
4		1							
5		2							
6		3							
7		1							
8		2							
9		3							
10		1							
11		2							
12		3							
13		1							
14		2							
15		3							
16		1							
17		2							
18		3							
19		1							
20		2							
21		3							
22		1							
23		2							
24		3							
25		1							
26		2							

After the Data Table is created, the user can enter the SampleID and individual measurements for each compound and replicate in the group of samples:



	SampleID	Replicate	nonane	decane	undecane	dodecane	hexadecane
1	Sample 1	1	-26.05	-25.81	-24.06	-25.05	-25.44
2		2	-26.18	-25.94	-24.05	-24.61	-25.69
3		3	-26.15	-26.51	-23.97	-24.45	-23.57
4	Sample 2	1	-25.24	-24.84	-23.57	-24.59	-25.08
5		2	-25.55	-25.11	-25.04	-24.32	-24.67
6		3	-25.35	-24.8	-23.18	-23.9	-24.02
7	Sample 3	1	-26.4	-25.86	-25.27	-24.05	-23.14
8		2	-26.05	-25.3	-23.46	-21.74	-24.59
9		3	-25.55	-25.11	-25.04	-24.32	-24.67
10	Sample 4	1	-25.24	-24.84	-23.57	-24.59	-25.08
11		2	-25.55	-25.11	-25.04	-24.32	-24.67
12		3	-26.05	-25.81	-24.06	-25.05	-25.44
13	Sample 5	1	-28.23	-25.83	-24.1	-26.23	-23.24
14		2	-28.33	-25.88	-24.23	-26.34	-23.03
15		3	-27.99	-25.75	-24.01	-26.5	-23.3
16	Sample 6	1	-24.12	-26.23	-27.77	-28.21	-23.33
17		2	-24.33	-26.29	-27.69	-28.01	-24.01
18		3	-23.99	-26.15	-27.8	-28.3	-23.56
19		1					
20		2					
21		3					
22		1					
23		2					

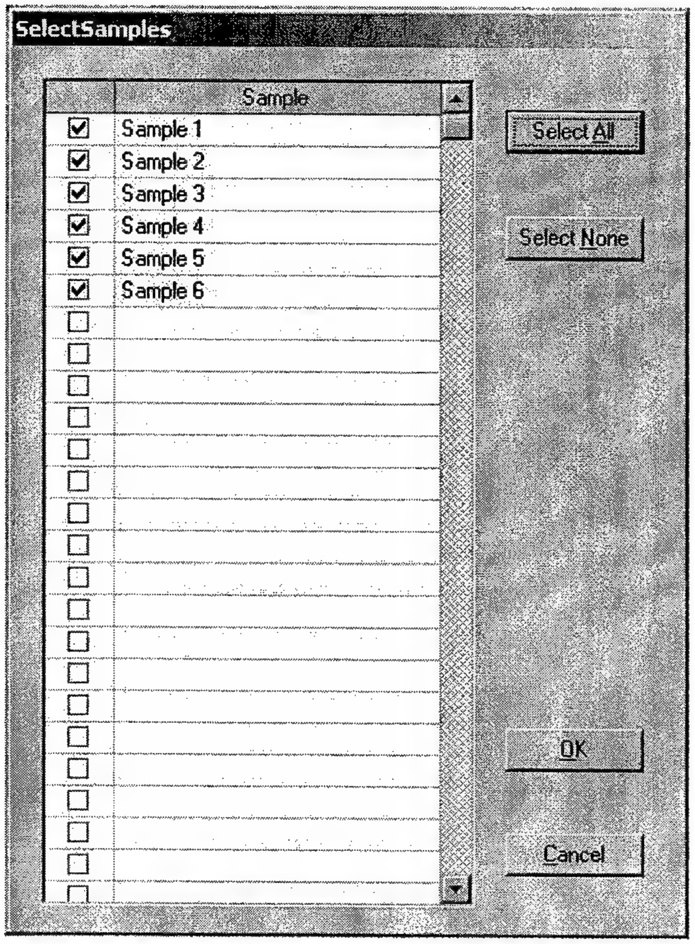
The program checks each isotope value to make sure it is >-100 and < 100 as a check for the user. Cells in the Replicate column are locked because the statistical methods rely on replicate analyses (of known and fixed value) for processing. User preferences for text style and cell colors can be made using the Format > Cells menu and toolbar icons:



	SampleID	Replicate	nonane	decane	undecane	dodecane	hexadecane
1	Sample 1	1	-26.05	-25.81	-24.06	-25.05	-25.44
2		2	-26.18	-25.94	-24.05	-24.61	-25.69
3		3	-26.15	**-26.51**	-23.97	-24.45	-23.57
4	Sample 2	1	-25.24	-24.84	-23.57	-24.59	-25.08
5		2	-25.55	-25.11	-25.04	-24.32	-24.67
6		3	-25.35	-24.8	-23.18	-23.9	-24.02
7	Sample 3	1	-26.4	-25.86	-25.27	-24.05	-23.14
8		2	-26.05	-25.3	-23.46	-21.74	-24.59
9		3	-25.55	-25.11	-25.04	-24.32	-24.67
10	Sample 4	1	-25.24	-24.84	-23.57	-24.59	-25.08
11		2	-25.55	-25.11	-25.04	-24.32	-24.67
12		3	-26.05	-25.81	-24.06	-25.05	-25.44
13	Sample 5	1	*-28.23*	-25.83	-24.1	-26.23	-23.24
14		2	-28.33	-25.88	-24.23	-26.34	-23.03
15		3	-27.99	-25.75	-24.01	[illegible]	-23.3
16	Sample 6	1	-24.12	-26.23	-27.77	-28.21	-23.33
17		2	-24.33	-26.29	-27.69	-28.01	-24.01
18		3	-23.99	-26.15	-27.8	-28.3	-23.56
19		1					
20		2					
21		3					
22		1					
23		2					

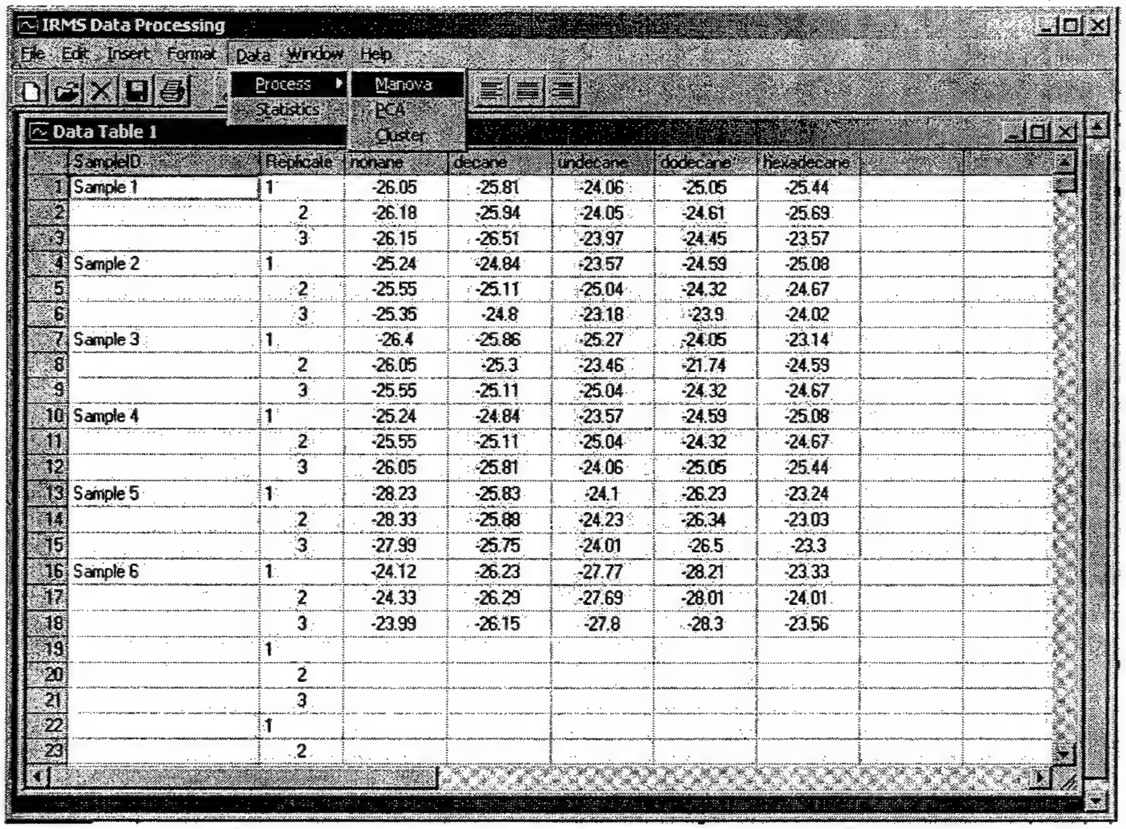
IV. Statistical Analyses

Statistical analyses are located under the Data menu. The user can choose between Manova, PCA and Cluster. Regardless of the choice, the user is presented with a dialog to select samples to be included in the analysis:

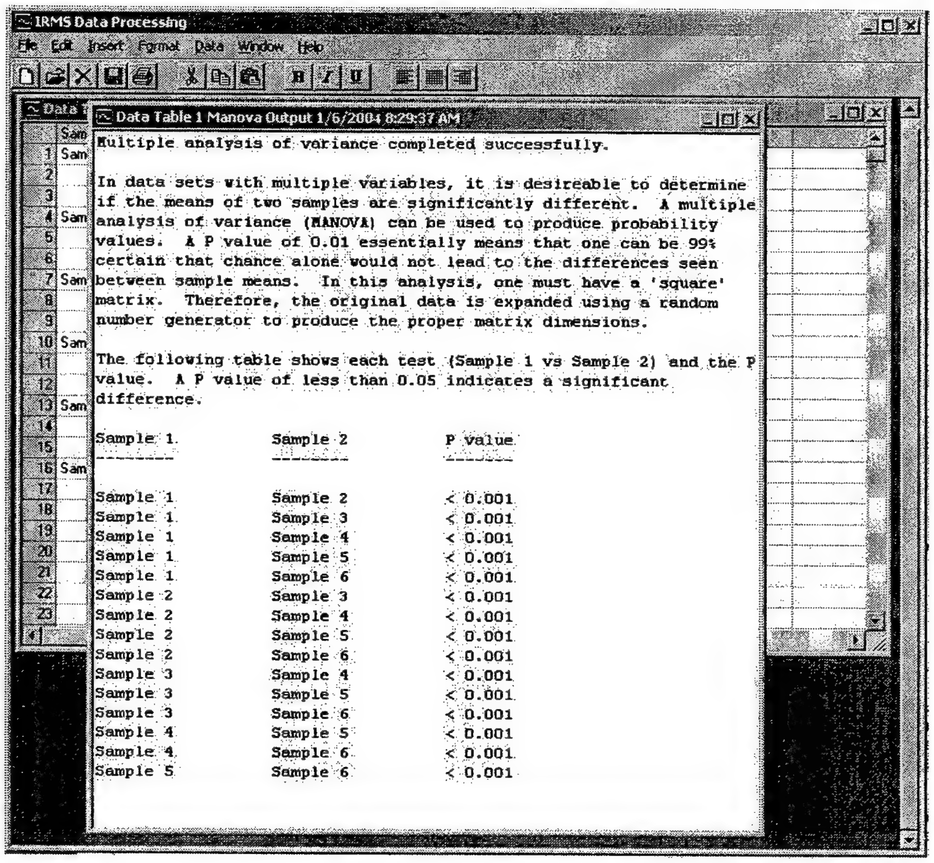


	Sample
✓	Sample 1
✓	Sample 2
✓	Sample 3
✓	Sample 4
✓	Sample 5
✓	Sample 6

A. Manova. The Manova analysis seeks to determine if there is a statistically significant difference in the means of each sample. The analysis relies on a square matrix of data so the initial step in the analysis is to determine the average and standard deviation of the original data. Using an internal algorithm, the software "expands" the data using a random numbers to create a square matrix with the same mean and standard deviation. The data are then analyzed and a table of P values is presented which allows the user to determine if there is a statistical difference between the samples in the analysis. A P value less than 0.05 are considered significant.



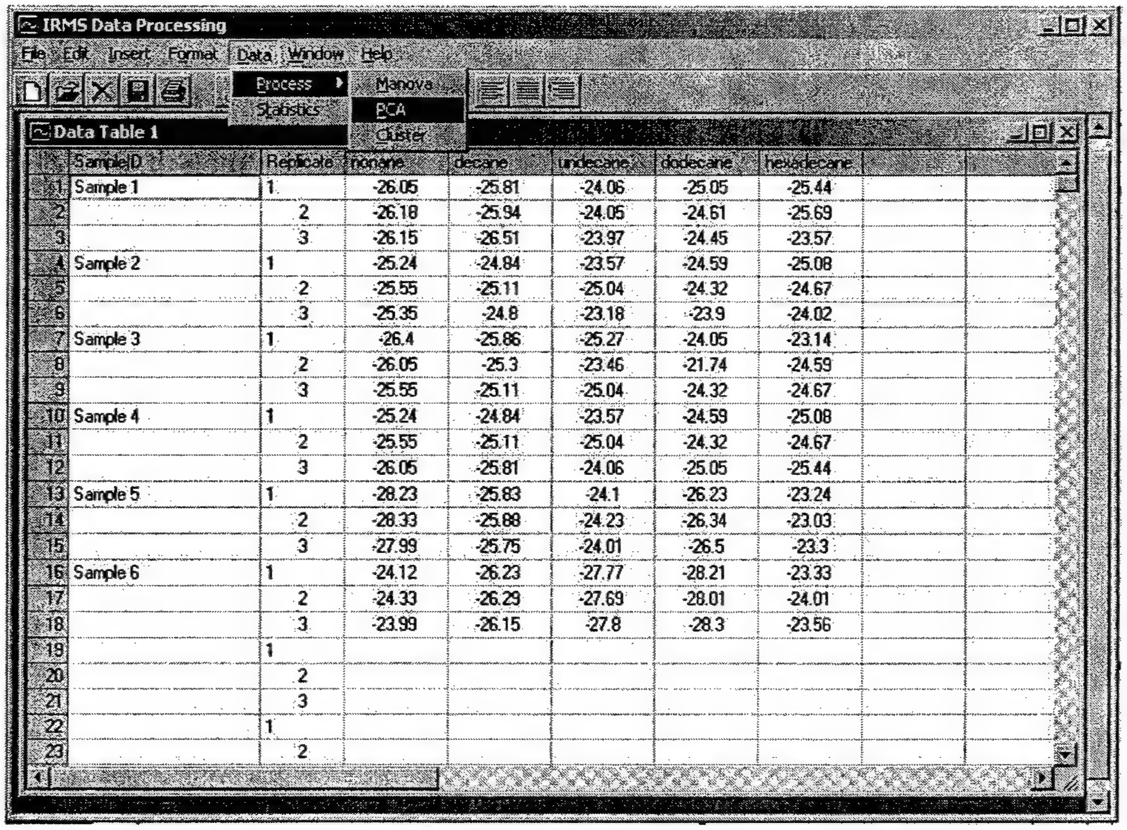
	SampleID	Replicate	nonane	decane	undecane	dodecane	hexadecane
1	Sample 1	1	-26.05	-25.81	-24.06	-25.05	-25.44
2		2	-26.18	-25.94	-24.05	-24.61	-25.69
3		3	-26.15	-26.51	-23.97	-24.45	-23.57
4	Sample 2	1	-25.24	-24.84	-23.57	-24.59	-25.08
5		2	-25.55	-25.11	-25.04	-24.32	-24.67
6		3	-25.35	-24.8	-23.18	-23.9	-24.02
7	Sample 3	1	-26.4	-25.86	-25.27	-24.05	-23.14
8		2	-26.05	-25.3	-23.46	-21.74	-24.59
9		3	-25.55	-25.11	-25.04	-24.32	-24.67
10	Sample 4	1	-25.24	-24.84	-23.57	-24.59	-25.08
11		2	-25.55	-25.11	-25.04	-24.32	-24.67
12		3	-26.05	-25.81	-24.06	-25.05	-25.44
13	Sample 5	1	-28.23	-25.83	-24.1	-26.23	-23.24
14		2	-28.33	-25.88	-24.23	-26.34	-23.03
15		3	-27.99	-25.75	-24.01	-26.5	-23.3
16	Sample 6	1	-24.12	-26.23	-27.77	-28.21	-23.33
17		2	-24.33	-26.29	-27.69	-28.01	-24.01
18		3	-23.99	-26.15	-27.8	-28.3	-23.56
19		1					
20		2					
21		3					
22		1					
23		2					


IRMS Data Processing

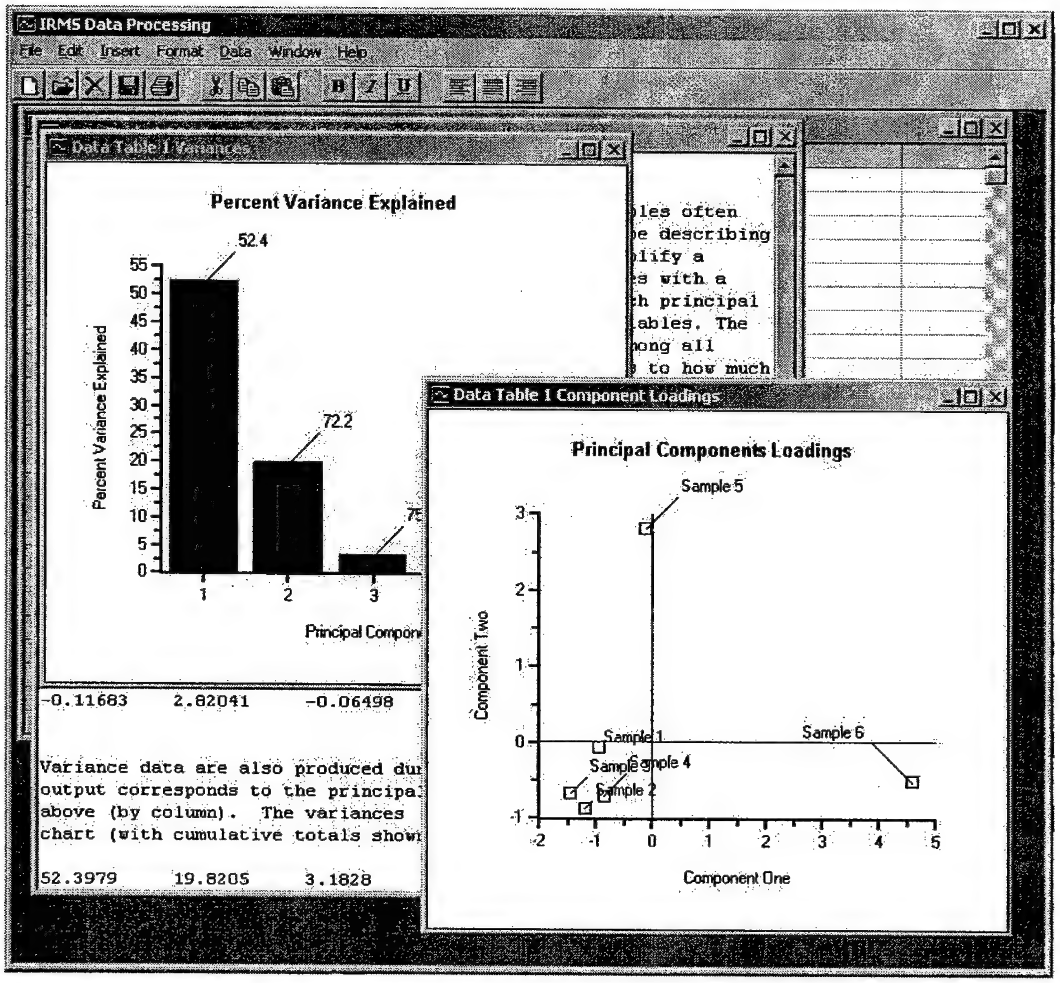
Data Table 1 Manova Output 1/6/2004 8:29:37 AM

```
Multiple analysis of variance completed successfully.

In data sets with multiple variables, it is desireable to determine
if the means of two samples are significantly different.  A multiple
analysis of variance (MANOVA) can be used to produce probability
values.  A P value of 0.01 essentially means that one can be 99%
certain that chance alone would not lead to the differences seen
between sample means.  In this analysis, one must have a 'square'
matrix.  Therefore, the original data is expanded using a random
number generator to produce the proper matrix dimensions.

The following table shows each test (Sample 1 vs Sample 2) and the P
value.  A P value of less than 0.05 indicates a significant
difference.

Sample 1           Sample 2           P value
--------           --------           -------

Sample 1           Sample 2           < 0.001
Sample 1           Sample 3           < 0.001
Sample 1           Sample 4           < 0.001
Sample 1           Sample 5           < 0.001
Sample 1           Sample 6           < 0.001
Sample 2           Sample 3           < 0.001
Sample 2           Sample 4           < 0.001
Sample 2           Sample 5           < 0.001
Sample 2           Sample 6           < 0.001
Sample 3           Sample 4           < 0.001
Sample 3           Sample 5           < 0.001
Sample 3           Sample 6           < 0.001
Sample 4           Sample 5           < 0.001
Sample 4           Sample 6           < 0.001
Sample 5           Sample 6           < 0.001
```

B. PCA. PCA is a method by which variability in data is represented by a "new" series of variables. These new components represent a principle of the variability in the original data set. The variability for each principal component is represented in a generated table. Typically, the first two components explain 70% or more of the intersample variability. For this reason, these components are graphed against one another so that data can be clustered into "like" samples. Samples that line up in Component One (i.e. have similar X distribution) are likely quite similar (if the first Component accounts for >50% of the variability). Samples that line up in the Component Two (i.e. have similar Y distribution) are also likely to be similar (because the second Component accounts for the second most variability). Those samples that cluster together when X is plotted again Y should therefore be very closely related. When PCA is selected in IRMS-DP, Component One is graphed against Component Two and the Variability attributable to each Component is also graphed. In addition, a text output is provided with an explanation of the graphs:



	SampleID	Replicate	nonane	decane	undecane	dodecane	hexadecane
1	Sample 1	1	-26.05	-25.81	-24.06	-25.05	-25.44
2		2	-26.18	-25.94	-24.05	-24.61	-25.69
3		3	-26.15	-26.51	-23.97	-24.45	-23.57
4	Sample 2	1	-25.24	-24.84	-23.57	-24.59	-25.08
5		2	-25.55	-25.11	-25.04	-24.32	-24.67
6		3	-25.35	-24.8	-23.18	-23.9	-24.02
7	Sample 3	1	-26.4	-25.86	-25.27	-24.05	-23.14
8		2	-26.05	-25.3	-23.46	-21.74	-24.59
9		3	-25.55	-25.11	-25.04	-24.32	-24.67
10	Sample 4	1	-25.24	-24.84	-23.57	-24.59	-25.08
11		2	-25.55	-25.11	-25.04	-24.32	-24.67
12		3	-26.05	-25.81	-24.06	-25.05	-25.44
13	Sample 5	1	-28.23	-25.83	-24.1	-26.23	-23.24
14		2	-28.33	-25.88	-24.23	-26.34	-23.03
15		3	-27.99	-25.75	-24.01	-26.5	-23.3
16	Sample 6	1	-24.12	-26.23	-27.77	-28.21	-23.33
17		2	-24.33	-26.29	-27.69	-28.01	-24.01
18		3	-23.99	-26.15	-27.8	-28.3	-23.56
19		1					
20		2					
21		3					
22		1					
23		2					


IRMS Data Processing
File Edit Insert Format Data Window Help
Data Table 1 Variances
Percent Variance Explained
52.4
72.2
75
Percent Variance Explained
Principal Compon
Data Table 1 Component Loadings
Principal Components Loadings
Sample 5
Sample 1
Sample 6
Sample 3
Sample 4
Sample 2
Component Two
Component One

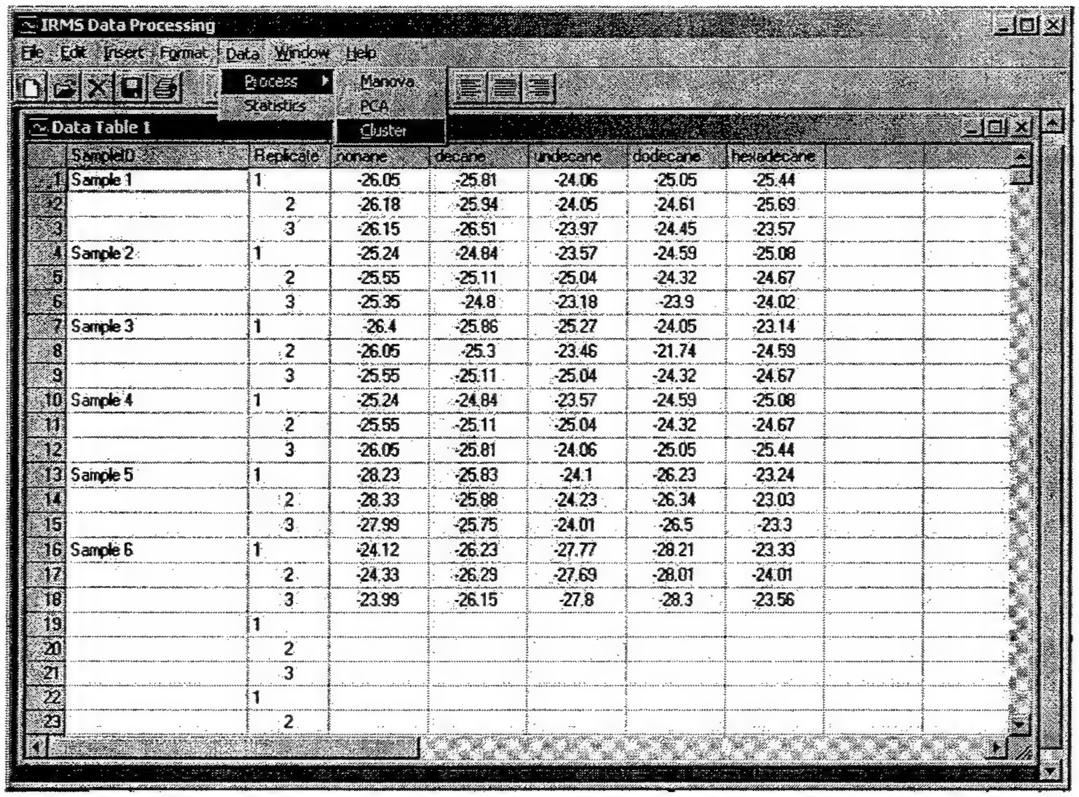
```
les often
e describing
lify a
s with a
h principal
ables. The
ong all
 to how much
```

```
-0.11683      2.82041      -0.06498
```

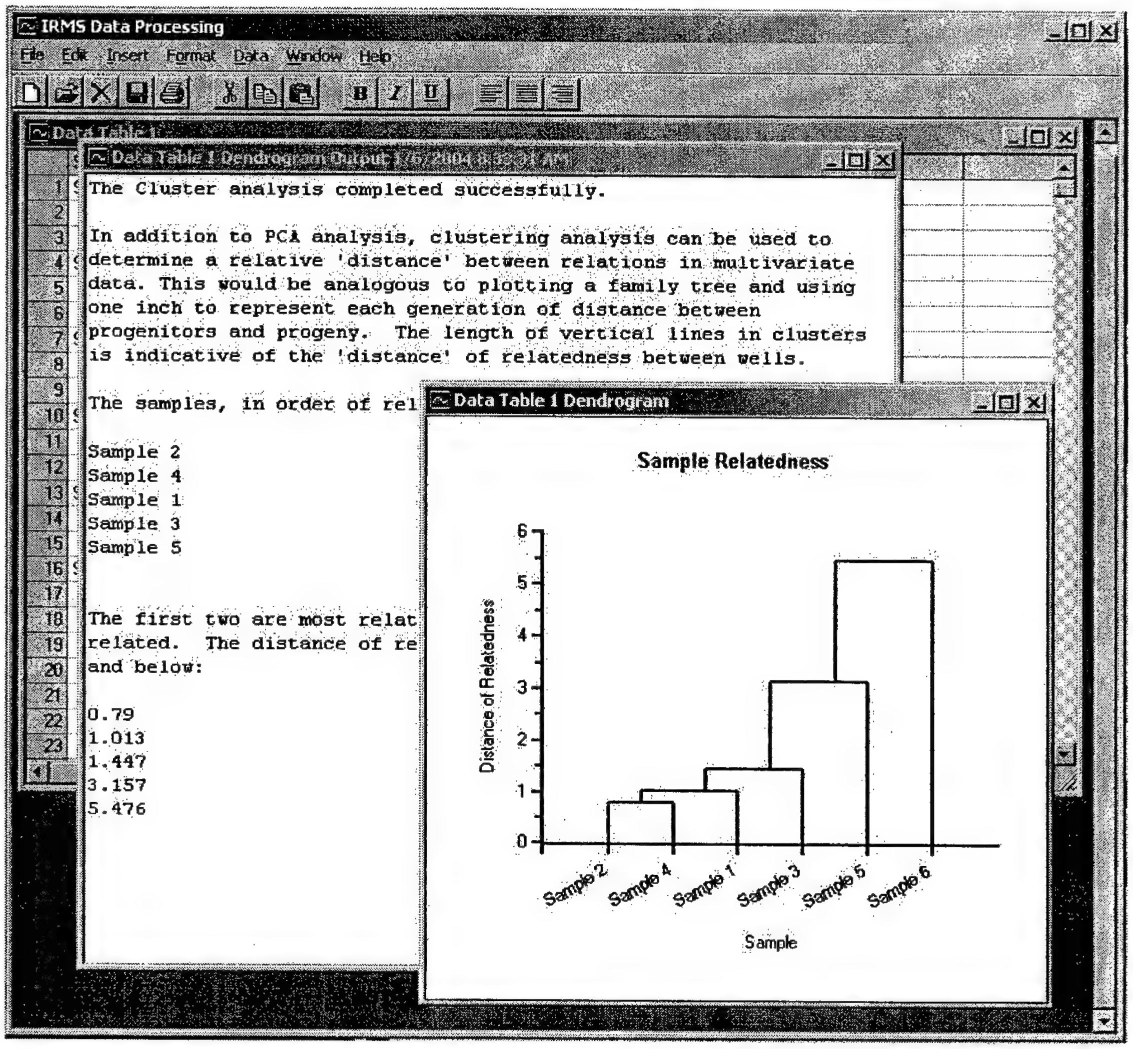
```
Variance data are also produced du
output corresponds to the principa
above (by column).  The variances
chart (with cumulative totals show
```

```
52.3979      19.8205      3.1828
```

C. Cluster. Clustering analysis can be used to determine a relative 'distance' between relations in multivariate data. The length of vertical lines in clusters is indicative of the 'distance' of relatedness between wells. When the Cluster analysis is selected, the data are analyzed and a dendrogram is presented to the user along with a text description of the graphic.



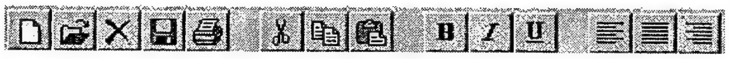
	SampleID	Replicate	nonane	decane	undecane	dodecane	hexadecane
1	Sample 1	1	-26.05	-25.81	-24.06	-25.05	-25.44
2		2	-26.18	-25.94	-24.05	-24.61	-25.69
3		3	-26.15	-26.51	-23.97	-24.45	-23.57
4	Sample 2	1	-25.24	-24.84	-23.57	-24.59	-25.08
5		2	-25.55	-25.11	-25.04	-24.32	-24.67
6		3	-25.35	-24.8	-23.18	-23.9	-24.02
7	Sample 3	1	-26.4	-25.86	-25.27	-24.05	-23.14
8		2	-26.05	-25.3	-23.46	-21.74	-24.59
9		3	-25.55	-25.11	-25.04	-24.32	-24.67
10	Sample 4	1	-25.24	-24.84	-23.57	-24.59	-25.08
11		2	-25.55	-25.11	-25.04	-24.32	-24.67
12		3	-26.05	-25.81	-24.06	-25.05	-25.44
13	Sample 5	1	-28.23	-25.83	-24.1	-26.23	-23.24
14		2	-28.33	-25.88	-24.23	-26.34	-23.03
15		3	-27.99	-25.75	-24.01	-26.5	-23.3
16	Sample 6	1	-24.12	-26.23	-27.77	-28.21	-23.33
17		2	-24.33	-26.29	-27.69	-28.01	-24.01
18		3	-23.99	-26.15	-27.8	-28.3	-23.56
19		1					
20		2					
21		3					
22		1					
23		2					



```
The Cluster analysis completed successfully.

In addition to PCA analysis, clustering analysis can be used to
determine a relative 'distance' between relations in multivariate
data. This would be analogous to plotting a family tree and using
one inch to represent each generation of distance between
progenitors and progeny. The length of vertical lines in clusters
is indicative of the 'distance' of relatedness between wells.

The samples, in order of rel

Sample 2
Sample 4
Sample 1
Sample 3
Sample 5


The first two are most relat
related.  The distance of re
and below:

0.79
1.013
1.447
3.157
5.476
```

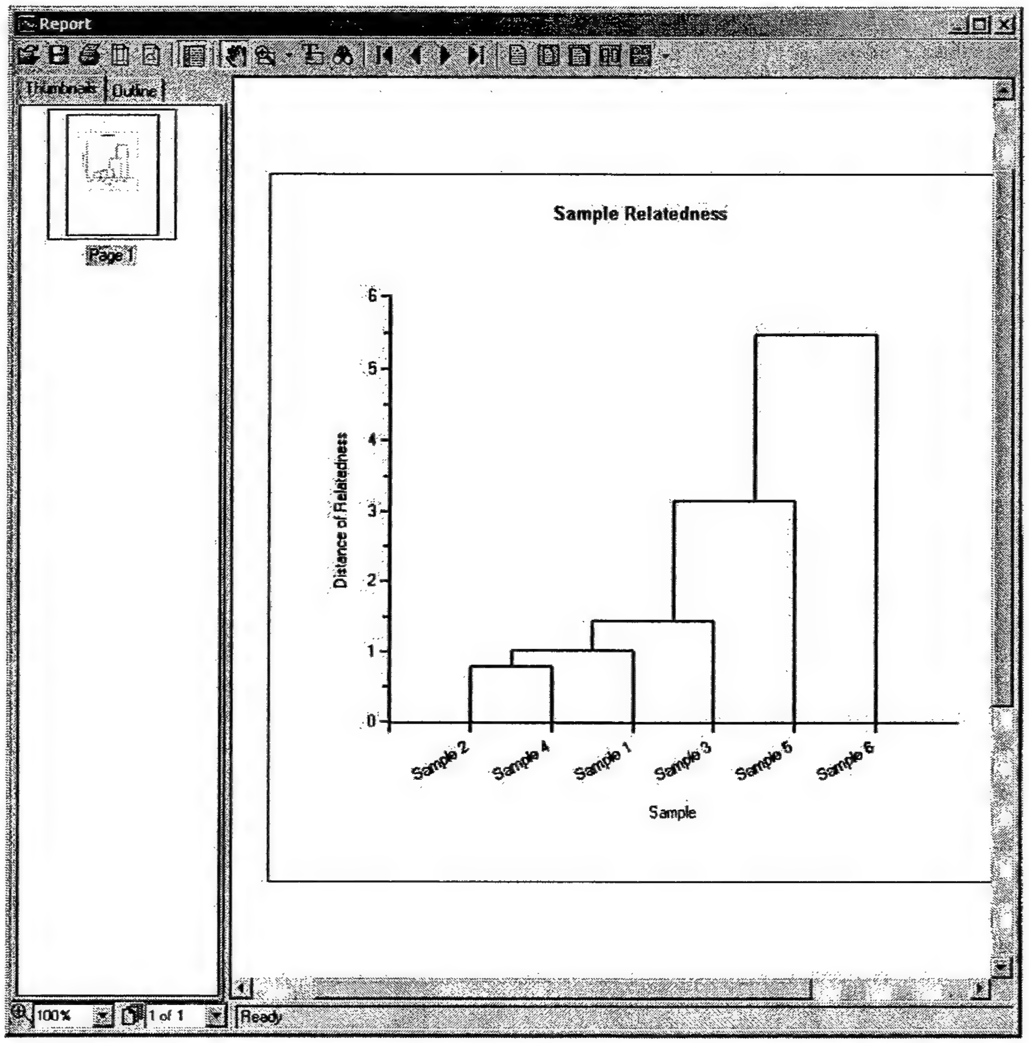
V. Export, Copying, Printing, and Saving Data and Graphics

The IRMS-DP package can export Data Tables, graphs and text windows. The easiest way to export these objects is to use the Windows clipboard. Copy operations can be conducted through the Edit menu, the button bar, and the context menu (right-click menu) available for each open object.



Alternatively, Table, text and graphs can be exported (Save As) to comma separated values (CSV), plain text (TXT) or enhanced metafile (EMF) respectively. Save operations are available through the File menu or through context menu(s) on each application sub-window.

Printing operations all use the same rendering engine. Each document type (Data Table, text, or graph) is converted to a print document and displayed to the user for additional print formatting. Pressing the Print icon in the preview toolbar sends the data to a selected printer:



VI. Exiting the Application

The application can be exited by pressing <Alt> F4, by clicking the X in the upper right-hand corner, or by selecting Exit under the File menu.

Literature Cited

Aggarwal P. K., R. E. Hinchee. 1991. Monitoring in situ biodegradation of hydrocarbons by using stable carbon isotopes. *Environ Sci Technol* 25:1178-1180.

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Meier-Augenstein W. 1995. On line recording of $^{13}C/^{12}C$ ratios and mass spectra in one gas chromatographic analysis. *High Resol Chromatogr* 18, 28-32.

O'Malley V. P., T. A. Abrajano Jr., J. Hellou. 1994. Determeination of the $^{13}C/^{12}C$ ratios of individual PAH from environmental samples: Can PAH sources be apportioned? *Org Geochem* 21:809-822.

O'Malley V. P., T. A. Abrajano Jr., J. Hellou. 1996. Stable carbon isotopic apportionment of individual polycyclic aromatic hydrocarbons in St. John's Harbour, Newfoundland. *Environ Sci Technol* 30:634-639.

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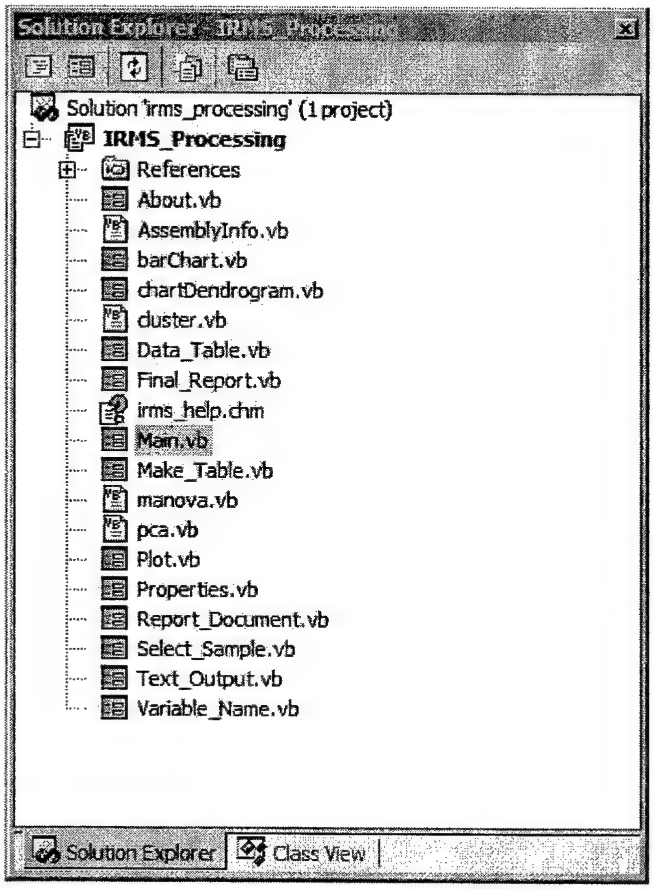
APPENDIX I

Code listing. The following pages list all of the Visual Basic Code used in the application. The individual component objects used in the project can be seen in the figure below. Code for each is included.



Solution Explorer - IRMS_Processing

```
Solution 'irms_processing' (1 project)
IRMS_Processing
    References
    About.vb
    AssemblyInfo.vb
    barChart.vb
    chartDendrogram.vb
    cluster.vb
    Data_Table.vb
    Final_Report.vb
    irms_help.chm
    Main.vb
    Make_Table.vb
    manova.vb
    pca.vb
    Plot.vb
    Properties.vb
    Report_Document.vb
    Select_Sample.vb
    Text_Output.vb
    Variable_Name.vb
```

```
Imports C1.Win.C1FlexGrid
Imports System.Text.RegularExpressions
Imports System.Data
Imports System.Drawing
Imports System.ComponentModel
Imports System.Collections
Imports C1.Common
Imports System.Drawing.Imaging
Imports System.Math
Imports System.Drawing.Printing
Imports System.IO
Imports C1.C1PrintDocument



Public Class Form1
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents MainMenu1 As System.Windows.Forms.MainMenu
    Friend WithEvents MenuItem6 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem10 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem12 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem18 As System.Windows.Forms.MenuItem
    Friend WithEvents PrintPreviewDialog1 As System.Windows.Forms.PrintPreviewDialog
    Friend WithEvents mnuFileExit As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFile As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFileNew As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFileOpen As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFileSave As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFileSaveAs As System.Windows.Forms.MenuItem
    Friend WithEvents FilePrintPreview As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFilePrint As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFileProperties As System.Windows.Forms.MenuItem
    Friend WithEvents mnuEdit As System.Windows.Forms.MenuItem
    Friend WithEvents mnuEditUndo As System.Windows.Forms.MenuItem
    Friend WithEvents mnuEditCut As System.Windows.Forms.MenuItem
    Friend WithEvents mnuEditCopy As System.Windows.Forms.MenuItem
    Friend WithEvents mnuEditPaste As System.Windows.Forms.MenuItem
    Friend WithEvents mnuEditDelete As System.Windows.Forms.MenuItem
    Friend WithEvents mnuDeleteTable As System.Windows.Forms.MenuItem
    Friend WithEvents mnuInsert As System.Windows.Forms.MenuItem
    Friend WithEvents mnuInsertColumns As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFormat As System.Windows.Forms.MenuItem
    Friend WithEvents mnuData As System.Windows.Forms.MenuItem
    Friend WithEvents mnuDataStatistics As System.Windows.Forms.MenuItem
    Friend WithEvents mnuWindow As System.Windows.Forms.MenuItem
    Friend WithEvents mnuHelp As System.Windows.Forms.MenuItem
    Friend WithEvents mnuHelpProgramHelp As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem2 As System.Windows.Forms.MenuItem
    Friend WithEvents mnuHelpAbout As System.Windows.Forms.MenuItem
    Friend WithEvents OpenFileDialog1 As System.Windows.Forms.OpenFileDialog
    Friend WithEvents SaveFileDialog1 As System.Windows.Forms.SaveFileDialog
    Friend WithEvents PrintDialog1 As System.Windows.Forms.PrintDialog
    Friend WithEvents PageSetupDialog1 As System.Windows.Forms.PageSetupDialog
    Friend WithEvents mnuDataProcess As System.Windows.Forms.MenuItem
    Friend WithEvents mnuDataProcessManova As System.Windows.Forms.MenuItem
    Friend WithEvents mnuDataProcessPCA As System.Windows.Forms.MenuItem
    Friend WithEvents mnuDataProcessCluster As System.Windows.Forms.MenuItem
    Friend WithEvents mnuWindowTile As System.Windows.Forms.MenuItem
    Friend WithEvents mnuWindowCascade As System.Windows.Forms.MenuItem
    Friend WithEvents mnuArrangeIcons As System.Windows.Forms.MenuItem
    Friend WithEvents WindowCloseAll As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFormatCellsFont As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFormatCellsColor As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFileClose As System.Windows.Forms.MenuItem
    Friend WithEvents ToolBar1 As System.Windows.Forms.ToolBar
    Friend WithEvents tlbFileNew As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFileOpen As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFileClose As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFileSave As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbEditCut As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbEditCopy As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbEditPaste As System.Windows.Forms.ToolBarButton
    Friend WithEvents ImageList1 As System.Windows.Forms.ImageList
    Friend WithEvents ToolBarButton1 As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFilePrint As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton2 As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFormatBold As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFormatItalics As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFormatUnderline As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFormatLeftJustified As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFormatCenterJustified As System.Windows.Forms.ToolBarButton
    Friend WithEvents tlbFormatRightJustified As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton3 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton4 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton5 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton6 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton7 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton8 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton13 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton14 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton15 As System.Windows.Forms.ToolBarButton
    Friend WithEvents ToolBarButton16 As System.Windows.Forms.ToolBarButton
    Friend WithEvents mnuInsertRows As System.Windows.Forms.MenuItem
    Friend WithEvents mnuFormatCells As System.Windows.Forms.MenuItem
    Friend WithEvents FontDialog1 As System.Windows.Forms.FontDialog
    Friend WithEvents ColorDialog1 As System.Windows.Forms.ColorDialog
    Friend WithEvents mnuFormatChart As System.Windows.Forms.MenuItem
    Friend WithEvents doc As C1.C1PrintDocument.C1PrintDocument
    Friend WithEvents HelpProvider1 As System.Windows.Forms.HelpProvider
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Me.components = New System.ComponentModel.Container
        Dim resources As System.Resources.ResourceManager = New System.Resources.          ↙
    ResourceManager(GetType(Form1))
        Me.MainMenu1 = New System.Windows.Forms.MainMenu
        Me.mnuFile = New System.Windows.Forms.MenuItem
        Me.mnuFileNew = New System.Windows.Forms.MenuItem
        Me.mnuFileOpen = New System.Windows.Forms.MenuItem
        Me.mnuFileClose = New System.Windows.Forms.MenuItem
        Me.mnuFileSave = New System.Windows.Forms.MenuItem
        Me.mnuFileSaveAs = New System.Windows.Forms.MenuItem
        Me.MenuItem6 = New System.Windows.Forms.MenuItem
        Me.FilePrintPreview = New System.Windows.Forms.MenuItem
        Me.mnuFilePrint = New System.Windows.Forms.MenuItem
        Me.MenuItem10 = New System.Windows.Forms.MenuItem
        Me.mnuFileProperties = New System.Windows.Forms.MenuItem
        Me.MenuItem12 = New System.Windows.Forms.MenuItem
        Me.mnuFileExit = New System.Windows.Forms.MenuItem
        Me.mnuEdit = New System.Windows.Forms.MenuItem
        Me.mnuEditUndo = New System.Windows.Forms.MenuItem
        Me.mnuEditCut = New System.Windows.Forms.MenuItem
        Me.mnuEditCopy = New System.Windows.Forms.MenuItem
        Me.mnuEditPaste = New System.Windows.Forms.MenuItem
        Me.MenuItem18 = New System.Windows.Forms.MenuItem
        Me.mnuEditDelete = New System.Windows.Forms.MenuItem
        Me.mnuDeleteTable = New System.Windows.Forms.MenuItem
        Me.mnuInsert = New System.Windows.Forms.MenuItem
        Me.mnuInsertColumns = New System.Windows.Forms.MenuItem
        Me.mnuInsertRows = New System.Windows.Forms.MenuItem
        Me.mnuFormat = New System.Windows.Forms.MenuItem
        Me.mnuFormatCells = New System.Windows.Forms.MenuItem
        Me.mnuFormatCellsFont = New System.Windows.Forms.MenuItem
        Me.mnuFormatCellsColor = New System.Windows.Forms.MenuItem
        Me.mnuFormatChart = New System.Windows.Forms.MenuItem
        Me.mnuData = New System.Windows.Forms.MenuItem
        Me.mnuDataProcess = New System.Windows.Forms.MenuItem
        Me.mnuDataProcessManova = New System.Windows.Forms.MenuItem
        Me.mnuDataProcessPCA = New System.Windows.Forms.MenuItem
        Me.mnuDataProcessCluster = New System.Windows.Forms.MenuItem
        Me.mnuDataStatistics = New System.Windows.Forms.MenuItem
        Me.mnuWindow = New System.Windows.Forms.MenuItem
        Me.mnuWindowTile = New System.Windows.Forms.MenuItem
        Me.mnuWindowCascade = New System.Windows.Forms.MenuItem
        Me.mnuArrangeIcons = New System.Windows.Forms.MenuItem
        Me.WindowCloseAll = New System.Windows.Forms.MenuItem
        Me.mnuHelp = New System.Windows.Forms.MenuItem
        Me.mnuHelpProgramHelp = New System.Windows.Forms.MenuItem
        Me.MenuItem2 = New System.Windows.Forms.MenuItem
        Me.mnuHelpAbout = New System.Windows.Forms.MenuItem
        Me.PrintPreviewDialog1 = New System.Windows.Forms.PrintPreviewDialog
        Me.OpenFileDialog1 = New System.Windows.Forms.OpenFileDialog
        Me.SaveFileDialog1 = New System.Windows.Forms.SaveFileDialog
        Me.PrintDialog1 = New System.Windows.Forms.PrintDialog
        Me.PageSetupDialog1 = New System.Windows.Forms.PageSetupDialog
        Me.ToolBar1 = New System.Windows.Forms.ToolBar
        Me.tlbFileNew = New System.Windows.Forms.ToolBarButton
        Me.tlbFileOpen = New System.Windows.Forms.ToolBarButton
        Me.tlbFileClose = New System.Windows.Forms.ToolBarButton
        Me.tlbFileSave = New System.Windows.Forms.ToolBarButton
        Me.tlbFilePrint = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton1 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton4 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton3 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton5 = New System.Windows.Forms.ToolBarButton
        Me.tlbEditCut = New System.Windows.Forms.ToolBarButton
        Me.tlbEditCopy = New System.Windows.Forms.ToolBarButton
        Me.tlbEditPaste = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton2 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton6 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton7 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton8 = New System.Windows.Forms.ToolBarButton
        Me.tlbFormatBold = New System.Windows.Forms.ToolBarButton
        Me.tlbFormatItalics = New System.Windows.Forms.ToolBarButton
        Me.tlbFormatUnderline = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton13 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton14 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton15 = New System.Windows.Forms.ToolBarButton
        Me.ToolBarButton16 = New System.Windows.Forms.ToolBarButton
        Me.tlbFormatLeftJustified = New System.Windows.Forms.ToolBarButton
        Me.tlbFormatCenterJustified = New System.Windows.Forms.ToolBarButton
        Me.tlbFormatRightJustified = New System.Windows.Forms.ToolBarButton
        Me.ImageList1 = New System.Windows.Forms.ImageList(Me.components)
        Me.FontDialog1 = New System.Windows.Forms.FontDialog
        Me.ColorDialog1 = New System.Windows.Forms.ColorDialog
        Me.doc = New C1.C1PrintDocument.C1PrintDocument
        Me.HelpProvider1 = New System.Windows.Forms.HelpProvider
        Me.SuspendLayout()
        '
        'MainMenu1
        '
        Me.MainMenu1.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.mnuFile,  ↙
    Me.mnuEdit, Me.mnuInsert, Me.mnuFormat, Me.mnuData, Me.mnuWindow, Me.mnuHelp})
        '
        'mnuFile
        '
        Me.mnuFile.Index = 0
        Me.mnuFile.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.mnuFileNew, ↙
    Me.mnuFileOpen, Me.mnuFileClose, Me.mnuFileSave, Me.mnuFileSaveAs, Me.MenuItem6, Me.  ↙
    FilePrintPreview, Me.mnuFilePrint, Me.MenuItem10, Me.mnuFileProperties, Me.MenuItem12,↙
     Me.mnuFileExit})
        Me.mnuFile.Text = "&File"
        '
        'mnuFileNew
        '
        Me.mnuFileNew.Index = 0
        Me.mnuFileNew.Shortcut = System.Windows.Forms.Shortcut.CtrlN
        Me.mnuFileNew.Text = "&New"
        '
        'mnuFileOpen
        '
        Me.mnuFileOpen.Index = 1
        Me.mnuFileOpen.Shortcut = System.Windows.Forms.Shortcut.CtrlO
        Me.mnuFileOpen.Text = "&Open"
        '
        'mnuFileClose
        '
        Me.mnuFileClose.Index = 2
        Me.mnuFileClose.Text = "&Close"
        '
        'mnuFileSave
        '
        Me.mnuFileSave.Index = 3
        Me.mnuFileSave.Shortcut = System.Windows.Forms.Shortcut.CtrlS
        Me.mnuFileSave.Text = "&Save"
        '
        'mnuFileSaveAs
        '
        Me.mnuFileSaveAs.Index = 4
        Me.mnuFileSaveAs.Text = "Save &As..."
        '
        'MenuItem6
        '
        Me.MenuItem6.Index = 5
        Me.MenuItem6.Text = "-"
        '
        'FilePrintPreview
        '
        Me.FilePrintPreview.Index = 6
        Me.FilePrintPreview.Text = "Print Pre&view"
        '
        'mnuFilePrint
        '
        Me.mnuFilePrint.Index = 7
        Me.mnuFilePrint.Text = "&Print"
        '
        'MenuItem10
        '
        Me.MenuItem10.Index = 8
        Me.MenuItem10.Text = "-"
        '
        'mnuFileProperties
        '
        Me.mnuFileProperties.Index = 9
        Me.mnuFileProperties.Text = "Propert&ies"
        '
        'MenuItem12
        '
        Me.MenuItem12.Index = 10
        Me.MenuItem12.Text = "-"
        '
        'mnuFileExit
        '
        Me.mnuFileExit.Index = 11
        Me.mnuFileExit.Shortcut = System.Windows.Forms.Shortcut.AltF4
        Me.mnuFileExit.Text = "E&xit"
        '
        'mnuEdit
        '
        Me.mnuEdit.Index = 1
        Me.mnuEdit.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.mnuEditUndo, ↙
   Me.mnuEditCut, Me.mnuEditCopy, Me.mnuEditPaste, Me.MenuItem18, Me.mnuEditDelete, Me. ↙
  mnuDeleteTable})
        Me.mnuEdit.Text = "&Edit"
        '
        'mnuEditUndo
        '
        Me.mnuEditUndo.Enabled = False
        Me.mnuEditUndo.Index = 0
        Me.mnuEditUndo.Text = "&Undo"
        '
        'mnuEditCut
        '
        Me.mnuEditCut.Index = 1
        Me.mnuEditCut.Text = "Cu&t"
        '
        'mnuEditCopy
        '
        Me.mnuEditCopy.Index = 2
        Me.mnuEditCopy.Text = "&Copy"
        '
        'mnuEditPaste
        '
        Me.mnuEditPaste.Index = 3
        Me.mnuEditPaste.Text = "&Paste"
        '
        'MenuItem18
        '
        Me.MenuItem18.Index = 4
        Me.MenuItem18.Text = "-"
        '
        'mnuEditDelete
        '
        Me.mnuEditDelete.Index = 5
        Me.mnuEditDelete.Text = "&Delete"
        '
        'mnuDeleteTable
        '
        Me.mnuDeleteTable.Index = 6
        Me.mnuDeleteTable.Text = "De&lete Column(s)"
        '
        'mnuInsert
        '
        Me.mnuInsert.Index = 2
        Me.mnuInsert.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.                ↙
    mnuInsertColumns, Me.mnuInsertRows})
        Me.mnuInsert.Text = "&Insert"
        Me.mnuInsert.Visible = False
        '
        'mnuInsertColumns
        '
        Me.mnuInsertColumns.Index = 0
        Me.mnuInsertColumns.Text = "&Columns"
        Me.mnuInsertColumns.Visible = False
        '
        'mnuInsertRows
        '
        Me.mnuInsertRows.Enabled = False
        Me.mnuInsertRows.Index = 1
        Me.mnuInsertRows.Text = "&Rows"
        '
        'mnuFormat
        '
        Me.mnuFormat.Index = 3
        Me.mnuFormat.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.                ↙
    mnuFormatCells, Me.mnuFormatChart})
        Me.mnuFormat.Text = "F&ormat"
        '
        'mnuFormatCells
        '
        Me.mnuFormatCells.Index = 0
        Me.mnuFormatCells.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.           ↙
    mnuFormatCellsFont, Me.mnuFormatCellsColor})
        Me.mnuFormatCells.Text = "&Cells"
        '
        'mnuFormatCellsFont
        '
        Me.mnuFormatCellsFont.Index = 0
        Me.mnuFormatCellsFont.Text = "&Font"
        '
        'mnuFormatCellsColor
        '
        Me.mnuFormatCellsColor.Index = 1
        Me.mnuFormatCellsColor.Text = "&Color"
        '
        'mnuFormatChart
        '
        Me.mnuFormatChart.Index = 1
        Me.mnuFormatChart.Text = "C&hart"
        '
        'mnuData
        '
        Me.mnuData.Index = 4
        Me.mnuData.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.                  ↙
    mnuDataProcess, Me.mnuDataStatistics})
        Me.mnuData.Text = "&Data"
        '
        'mnuDataProcess
        '
        Me.mnuDataProcess.Index = 0
        Me.mnuDataProcess.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.           ↙
    mnuDataProcessManova, Me.mnuDataProcessPCA, Me.mnuDataProcessCluster})
        Me.mnuDataProcess.Text = "&Process"
        '
        'mnuDataProcessManova
        '
        Me.mnuDataProcessManova.Index = 0
        Me.mnuDataProcessManova.Text = "&Manova"
        '
        'mnuDataProcessPCA
        '
        Me.mnuDataProcessPCA.Index = 1
        Me.mnuDataProcessPCA.Text = "&PCA"
        '
        'mnuDataProcessCluster
        '
        Me.mnuDataProcessCluster.Index = 2
        Me.mnuDataProcessCluster.Text = "&Cluster"
        '
        'mnuDataStatistics
        '
        Me.mnuDataStatistics.Index = 1
        Me.mnuDataStatistics.Text = "S&tatistics"
        Me.mnuDataStatistics.Visible = False
        '
        'mnuWindow
        '
        Me.mnuWindow.Index = 5
        Me.mnuWindow.MdiList = True
        Me.mnuWindow.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.    ↙
    mnuWindowTile, Me.mnuWindowCascade, Me.mnuArrangeIcons, Me.WindowCloseAll})
        Me.mnuWindow.Text = "&Window"
        '
        'mnuWindowTile
        '
        Me.mnuWindowTile.Index = 0
        Me.mnuWindowTile.Text = "&Tile"
        '
        'mnuWindowCascade
        '
        Me.mnuWindowCascade.Index = 1
        Me.mnuWindowCascade.Text = "&Cascade"
        '
        'mnuArrangeIcons
        '
        Me.mnuArrangeIcons.Index = 2
        Me.mnuArrangeIcons.Text = "&Arrange Icons"
        '
        'WindowCloseAll
        '
        Me.WindowCloseAll.Index = 3
        Me.WindowCloseAll.Text = "&Close All"
        '
        'mnuHelp
        '
        Me.mnuHelp.Index = 6
        Me.mnuHelp.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.    ↙
    mnuHelpProgramHelp, Me.MenuItem2, Me.mnuHelpAbout})
        Me.mnuHelp.Text = "&Help"
        '
        'mnuHelpProgramHelp
        '
        Me.mnuHelpProgramHelp.Index = 0
        Me.mnuHelpProgramHelp.Text = "&Program Help"
        '
        'MenuItem2
        '
        Me.MenuItem2.Index = 1
        Me.MenuItem2.Text = "-"
        '
        'mnuHelpAbout
        '
        Me.mnuHelpAbout.Index = 2
        Me.mnuHelpAbout.Text = "&About..."
        '
        'PrintPreviewDialog1
        '
        Me.PrintPreviewDialog1.AutoScrollMargin = New System.Drawing.Size(0, 0)
        Me.PrintPreviewDialog1.AutoScrollMinSize = New System.Drawing.Size(0, 0)
        Me.PrintPreviewDialog1.ClientSize = New System.Drawing.Size(400, 300)
        Me.PrintPreviewDialog1.Enabled = True
        Me.PrintPreviewDialog1.Icon = CType(resources.GetObject("PrintPreviewDialog1.Icon"↙
    ), System.Drawing.Icon)
        Me.PrintPreviewDialog1.Location = New System.Drawing.Point(125, 15)
        Me.PrintPreviewDialog1.MinimumSize = New System.Drawing.Size(375, 250)
        Me.PrintPreviewDialog1.Name = "PrintPreviewDialog1"
        Me.PrintPreviewDialog1.TransparencyKey = System.Drawing.Color.Empty
        Me.PrintPreviewDialog1.Visible = False
        '
        'ToolBar1
        '
        Me.ToolBar1.Buttons.AddRange(New System.Windows.Forms.ToolBarButton() {Me.          ↙
    tlbFileNew, Me.tlbFileOpen, Me.tlbFileClose, Me.tlbFileSave, Me.tlbFilePrint, Me.       ↙
    ToolBarButton1, Me.ToolBarButton4, Me.ToolBarButton3, Me.ToolBarButton5, Me.tlbEditCut↙
    , Me.tlbEditCopy, Me.tlbEditPaste, Me.ToolBarButton2, Me.ToolBarButton6, Me.          ↙
    ToolBarButton7, Me.ToolBarButton8, Me.tlbFormatBold, Me.tlbFormatItalics, Me.         ↙
    tlbFormatUnderline, Me.ToolBarButton13, Me.ToolBarButton14, Me.ToolBarButton15, Me.   ↙
    ToolBarButton16, Me.tlbFormatLeftJustified, Me.tlbFormatCenterJustified, Me.          ↙
    tlbFormatRightJustified})
        Me.ToolBar1.DropDownArrows = True
        Me.ToolBar1.ImageList = Me.ImageList1
        Me.ToolBar1.Location = New System.Drawing.Point(0, 0)
        Me.ToolBar1.Name = "ToolBar1"
        Me.ToolBar1.ShowToolTips = True
        Me.ToolBar1.Size = New System.Drawing.Size(974, 28)
        Me.ToolBar1.TabIndex = 1
        '
        'tlbFileNew
        '
        Me.tlbFileNew.ImageIndex = 14
        Me.tlbFileNew.ToolTipText = "New File"
        '
        'tlbFileOpen
        '
        Me.tlbFileOpen.ImageIndex = 16
        Me.tlbFileOpen.ToolTipText = "Open File"
        '
        'tlbFileClose
        '
        Me.tlbFileClose.ImageIndex = 2
        Me.tlbFileClose.ToolTipText = "Close File"
        '
        'tlbFileSave
        '
        Me.tlbFileSave.ImageIndex = 23
        Me.tlbFileSave.ToolTipText = "Save"
        '
        'tlbFilePrint
        '
        Me.tlbFilePrint.ImageIndex = 21
        Me.tlbFilePrint.ToolTipText = "Print"
        '
        'ToolBarButton1
        '
        Me.ToolBarButton1.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton4
        '
        Me.ToolBarButton4.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton3
        '
        Me.ToolBarButton3.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton5
        '
        Me.ToolBarButton5.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'tlbEditCut
        '
        Me.tlbEditCut.ImageIndex = 4
        Me.tlbEditCut.ToolTipText = "Cut"
        '
        'tlbEditCopy
        '
        Me.tlbEditCopy.ImageIndex = 3
        Me.tlbEditCopy.ToolTipText = "Copy"
        '
        'tlbEditPaste
        '
        Me.tlbEditPaste.ImageIndex = 20
        Me.tlbEditPaste.ToolTipText = "Paste"
        '
        'ToolBarButton2
        '
        Me.ToolBarButton2.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton6
        '
        Me.ToolBarButton6.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton7
        '
        Me.ToolBarButton7.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton8
        '
        Me.ToolBarButton8.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'tlbFormatBold
        '
        Me.tlbFormatBold.ImageIndex = 0
        Me.tlbFormatBold.ToolTipText = "Bold"
        '
        'tlbFormatItalics
        '
        Me.tlbFormatItalics.ImageIndex = 6
        Me.tlbFormatItalics.ToolTipText = "Italics"
        '
        'tlbFormatUnderline
        '
        Me.tlbFormatUnderline.ImageIndex = 27
        Me.tlbFormatUnderline.ToolTipText = "Underline"
        '
        'ToolBarButton13
        '
        Me.ToolBarButton13.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton14
        '
        Me.ToolBarButton14.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton15
        '
        Me.ToolBarButton15.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'ToolBarButton16
        '
        Me.ToolBarButton16.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'tlbFormatLeftJustified
        '
        Me.tlbFormatLeftJustified.ImageIndex = 9
        Me.tlbFormatLeftJustified.ToolTipText = "Left Justified"
        '
        'tlbFormatCenterJustified
        '
        Me.tlbFormatCenterJustified.ImageIndex = 8
        Me.tlbFormatCenterJustified.ToolTipText = "Center Justified"
        '
        'tlbFormatRightJustified
        '
        Me.tlbFormatRightJustified.ImageIndex = 11
        Me.tlbFormatRightJustified.ToolTipText = "Right Justified"
        '
        'ImageList1
        '
        Me.ImageList1.ImageSize = New System.Drawing.Size(16, 16)
        Me.ImageList1.ImageStream = CType(resources.GetObject("ImageList1.ImageStream"), ↙
    System.Windows.Forms.ImageListStreamer)
        Me.ImageList1.TransparentColor = System.Drawing.Color.Transparent
        '
        'doc
        '
        Me.doc.C1DPageSettings = "color:True;landscape:False;margins:100,100,100,100; ↙
    papersize:850,1100,TAB1AHQAdAB" & _
        "1AHIAIAAoADgALgA1ACAAeAAgADEAMQAgAGkAbgAuACkAIAA="
        Me.doc.ColumnSpacingStr = "0.5in"
        Me.doc.ColumnSpacingUnit.DefaultType = True
        Me.doc.ColumnSpacingUnit.UnitValue = "0.5in"
        Me.doc.DefaultUnit = C1.C1PrintDocument.UnitTypeEnum.Inch
        Me.doc.DocumentName = ""
        '
        'HelpProvider1
        '
        Me.HelpProvider1.HelpNamespace = "C:\Documents and Settings\tjb\My Documents\ ↙
    Visual Studio Projects\IRMS_Processing" & _
        "_NC\Help\IRMS_help.chm"
        '
        'Form1
        '
        Me.AccessibleDescription = ""
        Me.AccessibleName = ""
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(974, 753)
        Me.Controls.Add(Me.ToolBar1)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.IsMdiContainer = True
        Me.Menu = Me.MainMenu1
        Me.Name = "Form1"
        Me.Text = "IRMS Data Processing"
        Me.ResumeLayout(False)

    End Sub

#End Region


    Private myColumnsOfData As Integer
    Private myRowsOfData As Integer
    Private lastFilterIndex As Integer = 1
    Private myManova As manovaexpandtjb.expandtable
    Private myManova_p As manova_probability.manova_p
    Private myPCA_Output As PCA_output.PCA_output_data
    Private myLinkages As linkages.pdist_linkage
    Private myClusterLinks As clusters_tjb.clusterlinks
    Private myFileName As String
    Private myDendrogram As dendrogram_tjb.dendrogram_tjb_output
    Private myManova_stats As manova_stats.manova_stats
    Private myManova_stats_expanded As manova_expand_stats.manova_expand_statistics
    Private myManova_statsFunctions As manova_expand_stats.manova_expand_statistics
    Friend WithEvents currentGrid As C1.Win.C1FlexGrid.C1FlexGrid

    Private Property RowsOfData() As Integer
        Get
            Return myRowsOfData
        End Get
        Set(ByVal Value As Integer)
            myRowsOfData = Value
        End Set
    End Property

    Private Property ColumnsOfData() As Integer
        Get
            Return myColumnsOfData
        End Get
        Set(ByVal Value As Integer)
            myColumnsOfData = Value
        End Set
    End Property

    Private ReadOnly Property FileName() As String
        Get
            Return CType(myFileName, String)
        End Get

    End Property


    Dim WithEvents PrintDoc As PrintDocument
    Dim currPage As Integer
    Dim lastPage As Integer

    Dim myActiveForm As Form

    Public Sub ShowGrid(ByVal grid As C1.Win.C1FlexGrid.C1FlexGrid)
        currentGrid = grid
        MakeDoc(Me.doc, Nothing)
        Dim aprev As New Final_Report
        AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf MakeDoc)
        aprev.C1PrintPreview1.Document = Me.doc
        aprev.ShowDialog()
        RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf MakeDoc)
        currentGrid = Nothing
        aprev.Dispose()
    End Sub

    Private Sub MakeDoc(ByVal doc As C1PrintDocument, ByVal e As GenerateEventArgs)
        Dim StyleText As New C1DocStyle(doc)
        StyleText.ShapeLine = New LineDef(Color.White, 1)
        StyleText.ShapeFillColor = Color.Transparent
        StyleText.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Center
        StyleText.Font = New Font("Times New Roman", 14, FontStyle.Bold)
        StyleText.TextColor = Color.Black
        With doc
            .DefaultUnit = C1.C1PrintDocument.UnitTypeEnum.Mm
            .PageHeader.Height = 0
            .PageFooter.Height = 5
            '.PageHeader.RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum↙
    .Justify
```

```
            '.PageHeader.RenderText.Text = "Page [@@PageNo@@] of [@@PageCount@@]"
            .PageFooter.RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.↙
    Justify
            .PageFooter.RenderText.Style.TextAlignVert = C1.C1PrintDocument.AlignVertEnum.↙
    Bottom
            .PageFooter.RenderText.Text = "Page [@@PageNo@@] of [@@PageCount@@]"
            .StartDoc()

            .RenderBlockC1Printable(currentGrid, .BodyAreaSize.Width, .BodyAreaSize.Height↙
    , Nothing, StyleText)
            .EndDoc()
        End With
    End Sub


    Public Sub InternalPrintGrid(ByVal flexgrid As C1FlexGrid)

        ' get grid's PrintDocument object
        Dim pd As System.Drawing.Printing.PrintDocument
        pd = flexgrid.PrintParameters.PrintDocument()

        ' set up the page (landscape, 1.5" left margin)
        With pd.DefaultPageSettings
            .Landscape = True
            .Margins.Left = 150
        End With

        ' set up header and footer fonts
        flexgrid.PrintParameters.HeaderFont = New Font("Arial Black", 14, FontStyle.Bold)
        flexgrid.PrintParameters.FooterFont = New Font("Arial Narrow", 8, FontStyle.Italic↙
    )

        ' preview the grid
        flexgrid.PrintGrid(flexgrid.Text, PrintGridFlags.ShowPreviewDialog)
        'flexgrid.PrintGrid("VB Tutorial", PrintGridFlags.ShowPreviewDialog, _
        '     "VB Tutorial" + Chr(9) + Chr(9) + Format(DateTime.Now, "d"), _
        '     Chr(9) + Chr(9) + "Page {0} of {1}")
    End Sub



    Public Sub CheckForExistingInstance()
        'Get number of processes of you program
        If Process.GetProcessesByName _
          (Process.GetCurrentProcess.ProcessName).Length > 1 Then

            MessageBox.Show _
             ("Another Instance of this process is already running", _
                 "Multiple Instances Forbidden", _
                  MessageBoxButtons.OK, _
                 MessageBoxIcon.Exclamation)
            Application.Exit()
        End If
    End Sub

    Private Sub mnuFileOpen_Click(ByVal sender As System.Object, ByVal e As System.       ↙
    EventArgs) Handles mnuFileOpen.Click
        Dim OpenDlg As New OpenFileDialog
        Dim DataTable As New Data_Table
        'DataTable = CType(Me.ActiveMdiChild, Data_Table)
        With OpenDlg
            .FileName = ""
            .Filter = "Comma Separated (*.csv)|*.csv|Text files (*.txt)|*.txt|All files (*↙
    .*)|*.*"
            .FilterIndex = 1
            .CheckFileExists = True
            If .ShowDialog() = DialogResult.Cancel Then Return
            Try
                If OpenDlg.FileName.EndsWith(".csv") Then
                    DataTable.DataTable.LoadGrid(OpenDlg.FileName, FileFormatEnum.    ↙
    TextComma, True)
                    DataTable.MdiParent = Me
                    DataTable.Show()
                End If
                If OpenDlg.FileName.EndsWith(".txt") Then
                    Dim txtOutput As New Text_Output
                    txtOutput.dataReport.LoadFile(OpenDlg.FileName)
                    txtOutput.MdiParent = Me
                    txtOutput.Show()
                End If


            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error Loading File", MessageBoxButtons.    ↙
    OKCancel, MessageBoxIcon.Hand)
            End Try
        End With

    End Sub

    Private Sub mnuFileSaveAs_Click(ByVal sender As System.Object, ByVal e As System.    ↙
    EventArgs) Handles mnuFileSaveAs.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim SaveAsDlg As New SaveFileDialog
            Dim DataTable As New Data_Table
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            With SaveAsDlg
                .FileName = ""
                .Filter = "Comma Separated (*.csv)|*.csv|All files (*.*)|*.*"
                .FilterIndex = 1
                If .ShowDialog() = DialogResult.Cancel Then Return
                DataTable.DataTable.SaveGrid(SaveAsDlg.FileName, FileFormatEnum.TextComma,↙
     True)
            End With
            myFileName = SaveAsDlg.FileName
        End If

        If Me.ActiveMdiChild.Name = "Plot" Then
            lastFilterIndex = 1
            Dim myPlot As Plot = CType(Me.ActiveMdiChild, Plot)
            Dim sfg As New SaveFileDialog

            sfg.Filter = "Metafiles (*.emf)|*.emf|" + "Bmp files (*.bmp)|*.bmp|" + "Gif    ↙
    files (*.gif)|*.gif|" + "Jpeg files (*.jpg;*.jpeg)|*.jpg;*.jpeg|" + "Png files (*.png)↙
    |*.png|" + "All graphic files (*.emf;*.bmp;*.gif;*.jpg;*.jpeg;*.png)|*.emf;*.bmp;*.gif↙
    ;*.jpg;*.jpeg;*.png"
            sfg.FilterIndex = lastFilterIndex
            sfg.OverwritePrompt = True
            sfg.CheckPathExists = True
            sfg.RestoreDirectory = False
            sfg.ValidateNames = True

            If sfg.ShowDialog() = DialogResult.OK Then
                Dim fn As String = sfg.FileName
                Dim indext As Integer = fn.LastIndexOf("."c)
                If indext < 0 Then
                    indext = fn.Length + 1
                    fn += ".emf"
                Else
```

```
                    indext += 1
                End If
                Dim ext As String = fn.Substring(indext)
                Dim imgfmt As ImageFormat = Nothing

                Select Case ext
                    Case "emf"
                        imgfmt = ImageFormat.Emf
                        myPlot.chartPCA.SaveImage(fn, imgfmt)

                    Case "bmp"
                        imgfmt = ImageFormat.Bmp

                    Case "gif"
                        imgfmt = ImageFormat.Gif

                    Case "jpeg", "jpg"
                        imgfmt = ImageFormat.Jpeg

                    Case "png"
                        imgfmt = ImageFormat.Png

                    Case Else
                        Return
                End Select

                lastFilterIndex = sfg.FilterIndex

                If Not imgfmt.Equals(ImageFormat.Emf) Then
                    Dim img As Image = myPlot.chartPCA.GetImage()
                    img.Save(fn, imgfmt)
                    img.Dispose()
                End If
            End If
            sfg.Dispose()
        End If

        If Me.ActiveMdiChild.Name = "barChart" Then
            lastFilterIndex = 1
            Dim mybarChart As barChart = CType(Me.ActiveMdiChild, barChart)
            Dim sfg As New SaveFileDialog

            sfg.Filter = "Metafiles (*.emf)|*.emf|" + "Bmp files (*.bmp)|*.bmp|" + "Gif    ↙
    files (*.gif)|*.gif|" + "Jpeg files (*.jpg;*.jpeg)|*.jpg;*.jpeg|" + "Png files (*.png)↙
    |*.png|" + "All graphic files (*.emf;*.bmp;*.gif;*.jpg;*.jpeg;*.png)|*.emf;*.bmp;*.gif↙
    ;*.jpg;*.jpeg;*.png"
            sfg.FilterIndex = lastFilterIndex
            sfg.OverwritePrompt = True
            sfg.CheckPathExists = True
            sfg.RestoreDirectory = False
            sfg.ValidateNames = True

            If sfg.ShowDialog() = DialogResult.OK Then
                Dim fn As String = sfg.FileName
                Dim indext As Integer = fn.LastIndexOf("."c)
                If indext < 0 Then
                    indext = fn.Length + 1
                    fn += ".emf"
                Else
                    indext += 1
                End If
                Dim ext As String = fn.Substring(indext)
                Dim imgfmt As ImageFormat = Nothing

                Select Case ext
                    Case "emf"
                        imgfmt = ImageFormat.Emf
                    mybarChart.chartBar.SaveImage(fn, imgfmt)

                Case "bmp"
                    imgfmt = ImageFormat.Bmp

                Case "gif"
                    imgfmt = ImageFormat.Gif

                Case "jpeg", "jpg"
                    imgfmt = ImageFormat.Jpeg

                Case "png"
                    imgfmt = ImageFormat.Png

                Case Else
                    Return
            End Select

            lastFilterIndex = sfg.FilterIndex

            If Not imgfmt.Equals(ImageFormat.Emf) Then
                Dim img As Image = mybarChart.chartBar.GetImage()
                img.Save(fn, imgfmt)
                img.Dispose()
            End If
        End If
        sfg.Dispose()
    End If

    If Me.ActiveMdiChild.Name = "chartDendrogram" Then
        lastFilterIndex = 1
        Dim mychartDendrogram As chartDendrogram = CType(Me.ActiveMdiChild,            ↙
chartDendrogram)
        Dim sfg As New SaveFileDialog

        sfg.Filter = "Metafiles (*.emf)|*.emf|" + "Bmp files (*.bmp)|*.bmp|" + "Gif    ↙
files (*.gif)|*.gif|" + "Jpeg files (*.jpg;*.jpeg)|*.jpg;*.jpeg|" + "Png files (*.png)↙
|*.png|" + "All graphic files (*.emf;*.bmp;*.gif;*.jpg;*.jpeg;*.png)|*.emf;*.bmp;*.gif↙
;*.jpg;*.jpeg;*.png"
        sfg.FilterIndex = lastFilterIndex
        sfg.OverwritePrompt = True
        sfg.CheckPathExists = True
        sfg.RestoreDirectory = False
        sfg.ValidateNames = True

        If sfg.ShowDialog() = DialogResult.OK Then
            Dim fn As String = sfg.FileName
            Dim indext As Integer = fn.LastIndexOf("."c)
            If indext < 0 Then
                indext = fn.Length + 1
                fn += ".emf"
            Else
                indext += 1
            End If
            Dim ext As String = fn.Substring(indext)
            Dim imgfmt As ImageFormat = Nothing

            Select Case ext
                Case "emf"
                    imgfmt = ImageFormat.Emf
                    mychartDendrogram.chDendrogram.SaveImage(fn, imgfmt)

                Case "bmp"
                    imgfmt = ImageFormat.Bmp

                Case "gif"
                    imgfmt = ImageFormat.Gif
                Case "jpeg", "jpg"
                    imgfmt = ImageFormat.Jpeg

                Case "png"
                    imgfmt = ImageFormat.Png

                Case Else
                    Return
            End Select

            lastFilterIndex = sfg.FilterIndex

            If Not imgfmt.Equals(ImageFormat.Emf) Then
                Dim img As Image = mychartDendrogram.chDendrogram.GetImage()
                img.Save(fn, imgfmt)
                img.Dispose()
            End If
        End If
        sfg.Dispose()
    End If

    If Me.ActiveMdiChild.Name = "Text_Output" Then
        Dim TextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output)
        Dim saveFileDlg As New SaveFileDialog
        saveFileDlg.Filter = "Text files (*.txt)|*.txt|All files (*.*)|*.*"
        saveFileDlg.FilterIndex = 1
        saveFileDlg.FileName = saveFileDlg.FileName
        If saveFileDlg.ShowDialog() = DialogResult.OK Then
            TextOutput.dataReport.SaveFile(saveFileDlg.FileName)
        End If

    End If

End Sub

Private Sub mnuFileExit_Click(ByVal sender As System.Object, ByVal e As System.
EventArgs) Handles mnuFileExit.Click
    Application.Exit()
End Sub

Private Sub mnuHelpAbout_Click(ByVal sender As System.Object, ByVal e As System.
EventArgs) Handles mnuHelpAbout.Click
    Dim AboutDlg As New About
    myActiveForm = AboutDlg
    myActiveForm.ShowDialog()

End Sub



Private Sub mnuFileNew_Click(ByVal sender As System.Object, ByVal e As System.
EventArgs) Handles mnuFileNew.Click
    Dim DataTableMake As New Make_Table
    If DataTableMake.ShowDialog = DialogResult.OK Then
        Dim Replicates As String = DataTableMake.txtReplicateNumber.Text
        Dim VariableNames As New Variable_Names
        VariableNames.ShowDialog()
        If VariableNames.DialogResult = DialogResult.OK Then
            'Get all of the data in grid
            Dim i As Integer
            i = VariableNames.VariableNames.Rows.Count - 1
            'Define a grid with all of the data
            Dim VariableNamesList As New C1.Win.C1FlexGrid.CellRange
            VariableNamesList = VariableNames.VariableNames.GetCellRange(1, 0, i, 0)
            'Find out how many variables were put in the original list by seeking
```

```
                'out any alpha character followed by a newline character
                Dim q As Integer = 0
                'Find where the alpha next to \n characters are
                Dim re As New Regex("[a-zA-Z0-9]\x0D")
                Dim mc As MatchCollection = re.Matches(VariableNamesList.Clip)
                'Find out how many alpha next to \n characters there are
                q = mc.Count
                'reget the cell range based on this number (plus the 3 (more than 0) that ↙
    are added in the beginning
                VariableNamesList = VariableNames.VariableNames.GetCellRange(1, 0, q + 3, ↙
    0)
                'Replace the \n characters with
                Dim DataTable As New Data_Table
                DataTable.MdiParent = Me
                DataTable.ColumnHeaders = VariableNamesList.Clip
                DataTable.Replicates = Replicates
                Me.ColumnsOfData = CType(Replicates, Integer)
                DataTable.Show()

            Else
                Dim DataTable As New Data_Table
                DataTable.MdiParent = Me
                DataTable.Replicates = Replicates
                Me.ColumnsOfData = CType(Replicates, Integer)
                DataTable.Show()
            End If
        Else
            Dim Replicates As String = DataTableMake.txtReplicateNumber.Text
            Dim DataTable As New Data_Table
            DataTable.MdiParent = Me
            DataTable.Replicates = Replicates
            Me.ColumnsOfData = CType(Replicates, Integer)
            DataTable.Show()
        End If

    End Sub

    Private Sub mnuFileProperties_Click(ByVal sender As System.Object, ByVal e As System. ↙
    EventArgs) Handles mnuFileProperties.Click
        Dim Properties As New Properties
        Properties.MdiParent = Me
        Properties.Show()
        If Properties.DialogResult = DialogResult.OK Or Properties.DialogResult =        ↙
    DialogResult.Cancel Then
            Return
        End If
        Return
    End Sub

    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs)     ↙
    Handles MyBase.Load
    End Sub

    Private Sub mnuFormatCells_Click(ByVal sender As System.Object, ByVal e As System.    ↙
    EventArgs) Handles mnuFormatCells.Click
    End Sub

    Private Sub mnuFormatCellsFont_Click(ByVal sender As System.Object, ByVal e As System.↙
    EventArgs) Handles mnuFormatCellsFont.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If
        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table
            Dim SelectedFont As Font
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Dim Selection As CellRange
            Selection = DataTable.DataTable.Selection
            Dim FontDlg As New FontDialog
            If FontDlg.ShowDialog = DialogResult.OK Then
                SelectedFont = FontDlg.Font
                Selection.StyleNew.Font = SelectedFont
            End If
        End If
    End Sub

    Private Sub mnuHelpProgramHelp_Click(ByVal sender As System.Object, ByVal e As System.↙
    EventArgs) Handles mnuHelpProgramHelp.Click
        Help.ShowHelp(Me, HelpProvider1.HelpNamespace)
    End Sub

    Private Sub mnuWindowTile_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs) Handles mnuWindowTile.Click
        Me.LayoutMdi(System.Windows.Forms.MdiLayout.TileVertical)
    End Sub

    Private Sub mnuFileClose_Click(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles mnuFileClose.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If

        Me.ActiveMdiChild.Close()
    End Sub

    Private Sub mnuEditCopy_Click(ByVal sender As System.Object, ByVal e As System.       ↙
    EventArgs) Handles mnuEditCopy.Click

        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If

        If Me.ActiveMdiChild.Name = "Plot" Then
            Dim myPlot As Plot = CType(Me.ActiveMdiChild, Plot)
            myPlot.chartPCA.SaveImage(ImageFormat.Emf)
        End If

        If Me.ActiveMdiChild.Name = "chartDendrogram" Then
            Dim myDendrogram As chartDendrogram = CType(Me.ActiveMdiChild, chartDendrogram↙
    )
            myDendrogram.chDendrogram.SaveImage(ImageFormat.Emf)
        End If

        If Me.ActiveMdiChild.Name = "barChart" Then
            Dim mybarChart As barChart = CType(Me.ActiveMdiChild, barChart)
            mybarChart.chartBar.SaveImage(ImageFormat.Emf)
        End If

        If Me.ActiveMdiChild.Name = "Text_Output" Then
            Dim myTextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output)
            Dim Selection As String = myTextOutput.dataReport.SelectedText
            Clipboard.SetDataObject(Selection)
        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Clipboard.SetDataObject(DataTable.DataTable.Clip)
        End If
    End Sub

    Private Sub mnuEditPaste_Click(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles mnuEditPaste.Click
        If Me.ActiveMdiChild Is Nothing Then
```

```
            Return
        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Dim data As IDataObject = Clipboard.GetDataObject()
            If data.GetDataPresent(DataFormats.Text) Then
                ' there is, so paste it
                DataTable.DataTable.Select(DataTable.DataTable.Row, DataTable.DataTable. ↙
    Col, DataTable.DataTable.Rows.Count - 1, DataTable.DataTable.Cols.Count - 1, False)
                DataTable.DataTable.Clip = CType(data.GetData(DataFormats.Text), String)
                DataTable.DataTable.Select(DataTable.DataTable.Row, DataTable.DataTable. ↙
    Col)
            End If
        End If

    End Sub

    Private Sub mnuEditCut_Click(ByVal sender As System.Object, ByVal e As System.       ↙
    EventArgs) Handles mnuEditCut.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Clipboard.SetDataObject(DataTable.DataTable.Clip)
            Dim selected As CellRange
            selected = DataTable.DataTable.Selection
            selected.Data = Nothing
        End If

    End Sub

    Private Sub mnuEditDelete_Click(ByVal sender As System.Object, ByVal e As System.    ↙
    EventArgs) Handles mnuEditDelete.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If
        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Dim selected As CellRange
            selected = DataTable.DataTable.Selection
            selected.Data = Nothing
        End If
    End Sub

    Private Sub mnuDeleteTable_Click(ByVal sender As System.Object, ByVal e As System.   ↙
    EventArgs) Handles mnuDeleteTable.Click
        Dim DataTable As Data_Table
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If
        If Me.ActiveMdiChild.Name = "Data_Table" Then
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Dim selectedColumns As CellRange
            selectedColumns = DataTable.DataTable.Selection
            Dim selectedColumnLower As Integer = selectedColumns.c1
            Dim selectedColumnUpper As Integer = selectedColumns.c2
            Dim columnRange As ColumnCollection
            columnRange = DataTable.DataTable.Cols
            columnRange.DefaultSize = 70
            Dim columnCount As Integer
            For columnCount = selectedColumnLower To selectedColumnUpper
```

```
                columnRange.Remove(columnCount)
            Next
        End If
    End Sub

    Private Sub WindowCloseAll_Click(ByVal sender As System.Object, ByVal e As System.  ↙
    EventArgs) Handles WindowCloseAll.Click

        Dim ChildWindows As Integer
        Dim MdiChildren As Integer
        ChildWindows = Me.MdiChildren.GetLength(0)
        For MdiChildren = 1 To ChildWindows
            Me.ActiveMdiChild.Close()
        Next

    End Sub

    Private Sub mnuArrangeIcons_Click(ByVal sender As System.Object, ByVal e As System.  ↙
    EventArgs) Handles mnuArrangeIcons.Click

    End Sub

    Private Sub mnuWindowCascade_Click(ByVal sender As System.Object, ByVal e As System.  ↙
    EventArgs) Handles mnuWindowCascade.Click
    End Sub

    Private Sub mnuInsertColumns_Click(ByVal sender As System.Object, ByVal e As System.  ↙
    EventArgs) Handles mnuInsertColumns.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If
        Dim DataTable As Data_Table
        If Me.ActiveMdiChild.Name = "Data_Table" Then
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Dim selectedColumns As CellRange
            selectedColumns = DataTable.DataTable.Selection
            Dim selectedColumnLower As Integer = selectedColumns.c1
            Dim selectedColumnUpper As Integer = selectedColumns.c2
            Dim columnRange As ColumnCollection
            columnRange = DataTable.DataTable.Cols
            columnRange.DefaultSize = 70
            Dim columnCount As Integer
            For columnCount = selectedColumnLower To selectedColumnUpper
                columnRange.Insert(columnCount)
            Next
        End If
    End Sub

#Region " Toolbars  "

    Private Sub ToolBar1_ButtonClick(ByVal sender As System.Object, ByVal e As System.  ↙
    Windows.Forms.ToolBarButtonClickEventArgs) Handles ToolBar1.ButtonClick
        Select Case ToolBar1.Buttons.IndexOf(e.Button)
            Case 0
                'New
                Dim DataTableMake As New Make_Table
                If DataTableMake.ShowDialog = DialogResult.OK Then
                    Dim Replicates As String = DataTableMake.txtReplicateNumber.Text
                    Dim VariableNames As New Variable_Names
                    VariableNames.ShowDialog()
                    If VariableNames.DialogResult = DialogResult.OK Then
                        'Get all of the data in grid
                        Dim i As Integer
                        i = VariableNames.VariableNames.Rows.Count - 1
                        'Define a grid with all of the data
                        Dim VariableNamesList As New C1.Win.C1FlexGrid.CellRange
                        VariableNamesList = VariableNames.VariableNames.GetCellRange(1, 0,↙
  i, 0)
                     'Find out how many variables were put in the original list by ↙
 seeking
                     'out any alpha character followed by a newline character
                     Dim q As Integer = 0
                     'Find where the alpha next to \n characters are
                     Dim re As New Regex("[a-zA-Z]\x0D")
                     Dim mc As MatchCollection = re.Matches(VariableNamesList.Clip)
                     'Find out how many alpha next to \n characters there are
                     q = mc.Count
                     'reget the cell range based on this number (plus the 3 (more than ↙
 0) that are added in the beginning
                     VariableNamesList = VariableNames.VariableNames.GetCellRange(1, 0,↙
  q + 3, 0)
                     'Replace the \n characters with
                     Dim DataTable As New Data_Table
                     DataTable.MdiParent = Me
                     DataTable.ColumnHeaders = VariableNamesList.Clip
                     DataTable.Replicates = Replicates
                     DataTable.Show()

                 Else
                     Dim DataTable As New Data_Table
                     DataTable.MdiParent = Me
                     DataTable.Replicates = Replicates
                     DataTable.Show()
                 End If
             Else
                 Dim Replicates As String = DataTableMake.txtReplicateNumber.Text
                 Dim DataTable As New Data_Table
                 DataTable.MdiParent = Me
                 DataTable.Replicates = Replicates
                 DataTable.Show()
             End If

         Case 1
             'Open
             Dim OpenDlg As New OpenFileDialog
             With OpenDlg
                 .FileName = ""
                 .Filter = "Text files (*.txt)|*.txt|Comma Separated (*.csv)|*.xls|All ↙
 files (*.*)|*.*"
                 .FilterIndex = 1
                 .CheckFileExists = True
                 If .ShowDialog() = DialogResult.Cancel Then Return
             End With

         Case 2
             'Close
             If Me.ActiveMdiChild Is Nothing Then
                 Return
             End If
             Me.ActiveMdiChild.Close()
         Case 3
             'Save
         Case 4
             'Print
         Case 9
             'Cut
             If Me.ActiveMdiChild Is Nothing Then
                 Return
             End If
             If Me.ActiveMdiChild.Name = "Data_Table" Then
                 Dim DataTable As Data_Table
                 DataTable = CType(Me.ActiveMdiChild, Data_Table)
                 Clipboard.SetDataObject(DataTable.DataTable.Clip)
                 Dim selected As CellRange
```

```
                    selected = DataTable.DataTable.Selection
                    selected.Data = Nothing
                End If
            Case 10
                'Copy
                If Me.ActiveMdiChild Is Nothing Then
                    Return
                End If

                If Me.ActiveMdiChild.Name = "Plot" Then
                    Dim myPlot As Plot = CType(Me.ActiveMdiChild, Plot)
                    myPlot.chartPCA.SaveImage(ImageFormat.Emf)
                End If

                If Me.ActiveMdiChild.Name = "chartDendrogram" Then
                    Dim myDendrogram As chartDendrogram = CType(Me.ActiveMdiChild,            ↙
    chartDendrogram)
                    myDendrogram.chDendrogram.SaveImage(ImageFormat.Emf)
                End If

                If Me.ActiveMdiChild.Name = "barChart" Then
                    Dim mybarChart As barChart = CType(Me.ActiveMdiChild, barChart)
                    mybarChart.chartBar.SaveImage(ImageFormat.Emf)
                End If

                If Me.ActiveMdiChild.Name = "Text_Output" Then
                    Dim myTextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output↙
    )
                    Dim Selection As String = myTextOutput.dataReport.SelectedText
                    Clipboard.SetDataObject(Selection)
                End If

                If Me.ActiveMdiChild.Name = "Data_Table" Then
                    Dim DataTable As Data_Table
                    DataTable = CType(Me.ActiveMdiChild, Data_Table)
                    Clipboard.SetDataObject(DataTable.DataTable.Clip)
                End If

            Case 11
                'Paste
                If Me.ActiveMdiChild Is Nothing Then
                    Return
                End If
                If Me.ActiveMdiChild.Name = "Data_Table" Then
                    Dim DataTable As Data_Table
                    DataTable = CType(Me.ActiveMdiChild, Data_Table)
                    Dim data As IDataObject = Clipboard.GetDataObject()
                    If data.GetDataPresent(DataFormats.Text) Then
                        ' there is, so paste it
                        DataTable.DataTable.Select(DataTable.DataTable.Row, DataTable.     ↙
    DataTable.Col, DataTable.DataTable.Rows.Count - 1, DataTable.DataTable.Cols.Count - 1,↙
     False)
                        DataTable.DataTable.Clip = CType(data.GetData(DataFormats.Text),   ↙
    String)
                        DataTable.DataTable.Select(DataTable.DataTable.Row, DataTable.     ↙
    DataTable.Col)
                    End If
                End If
            Case 16
                'Bold
                If Me.ActiveMdiChild Is Nothing Then
                    Return
                End If
                If Me.ActiveMdiChild.Name = "Data_Table" Then
                    Dim DataTable As Data_Table
                    DataTable = CType(Me.ActiveMdiChild, Data_Table)
                    Dim CellRange As CellRange = DataTable.DataTable.Selection()
                    Dim cellStyle As CellStyle = DataTable.DataTable.Styles.Focus

                    If cellStyle.Font.Bold = True And Cellstyle.Font.Italic = True And    ↙
    CellStyle.Font.underline = True Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular Or FontStyle.Italic Or FontStyle.Underline)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = True And Cellstyle.Font.Italic = True And↙
     CellStyle.Font.underline = False Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular Or FontStyle.Italic)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = True And Cellstyle.Font.Italic = False   ↙
    And CellStyle.Font.underline = True Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular Or FontStyle.Underline)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = True And Cellstyle.Font.Italic = False   ↙
    And CellStyle.Font.underline = False Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = False And Cellstyle.Font.Italic = True   ↙
    And CellStyle.Font.underline = True Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.Bold↙
     Or FontStyle.Italic Or FontStyle.Underline)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = False And Cellstyle.Font.Italic = True   ↙
    And CellStyle.Font.underline = False Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.Bold↙
     Or FontStyle.Italic)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = False And Cellstyle.Font.Italic = False  ↙
    And CellStyle.Font.underline = True Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.Bold↙
     Or FontStyle.Underline)
                        CellRange.StyleNew.Font = cellStyle.Font

                    ElseIf cellStyle.Font.Bold = False And Cellstyle.Font.Italic = False  ↙
    And CellStyle.Font.underline = False Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.Bold↙
    )
                        CellRange.StyleNew.Font = cellStyle.Font

                    End If
                End If

            Case 17
                'Italics
                If Me.ActiveMdiChild Is Nothing Then
                    Return
                End If
                If Me.ActiveMdiChild.Name = "Data_Table" Then
                    Dim DataTable As Data_Table
                    DataTable = CType(Me.ActiveMdiChild, Data_Table)
                    Dim CellRange As CellRange = DataTable.DataTable.Selection
                    Dim cellStyle As CellStyle = DataTable.DataTable.Styles.Focus
                    If cellStyle.Font.Italic = True And Cellstyle.Font.Bold = True And    ↙
    CellStyle.Font.underline = True Then
                        cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular Or FontStyle.Bold Or FontStyle.Underline)
```

```
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = True And Cellstyle.Font.Bold = True And↙
 CellStyle.Font.underline = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Regular Or FontStyle.Bold)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = True And Cellstyle.Font.Bold = False  ↙
And CellStyle.Font.underline = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Regular Or FontStyle.Underline)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = True And Cellstyle.Font.Bold = False  ↙
And CellStyle.Font.underline = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Regular)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = False And Cellstyle.Font.Bold = True  ↙
And CellStyle.Font.underline = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Italic Or FontStyle.Bold Or FontStyle.Underline)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = False And Cellstyle.Font.Bold = True  ↙
And CellStyle.Font.underline = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Italic Or FontStyle.Bold)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = False And Cellstyle.Font.Bold = False ↙
And CellStyle.Font.underline = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Italic Or FontStyle.Underline)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Italic = False And Cellstyle.Font.Bold = False ↙
And CellStyle.Font.underline = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Italic)
                    CellRange.StyleNew.Font = cellStyle.Font

                End If
            End If

        Case 18
            'Underline
            If Me.ActiveMdiChild Is Nothing Then
                Return
            End If
            If Me.ActiveMdiChild.Name = "Data_Table" Then
                Dim DataTable As Data_Table
                DataTable = CType(Me.ActiveMdiChild, Data_Table)
                Dim CellRange As CellRange = DataTable.DataTable.Selection
                Dim cellStyle As CellStyle = DataTable.DataTable.Styles.Focus
                If cellStyle.Font.Underline = True And Cellstyle.Font.Italic = True  ↙
And CellStyle.Font.Bold = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Regular Or FontStyle.Italic Or FontStyle.Bold)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = True And Cellstyle.Font.Italic =   ↙
True And CellStyle.Font.Bold = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.   ↙
Regular Or FontStyle.Italic)
```

```
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = True And Cellstyle.Font.Italic =     ↙
    False And CellStyle.Font.Bold = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular Or FontStyle.Bold)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = True And Cellstyle.Font.Italic =     ↙
    False And CellStyle.Font.Bold = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Regular)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = False And Cellstyle.Font.Italic =    ↙
    True And CellStyle.Font.Bold = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Underline Or FontStyle.Italic Or FontStyle.Bold)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = False And Cellstyle.Font.Italic =    ↙
    True And CellStyle.Font.Bold = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Underline Or FontStyle.Italic)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = False And Cellstyle.Font.Italic =    ↙
    False And CellStyle.Font.Bold = True Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Underline Or FontStyle.Bold)
                    CellRange.StyleNew.Font = cellStyle.Font

                ElseIf cellStyle.Font.Underline = False And Cellstyle.Font.Italic =    ↙
    False And CellStyle.Font.Bold = False Then
                    cellStyle.Font = New Font(DataTable.DataTable.Font, FontStyle.    ↙
    Underline)
                    CellRange.StyleNew.Font = cellStyle.Font

                End If

            End If

        Case 23
            'Left Justified
            If Me.ActiveMdiChild Is Nothing Then
                Return
            End If
            If Me.ActiveMdiChild.Name = "Data_Table" Then
                Dim DataTable As Data_Table
                DataTable = CType(Me.ActiveMdiChild, Data_Table)
                Dim CellRange As CellRange = DataTable.DataTable.Selection
                Dim cellStyle As CellStyle = DataTable.DataTable.Styles.Focus
                cellStyle.TextAlign = TextAlignEnum.LeftCenter
                CellRange.StyleNew.TextAlign = cellStyle.TextAlign

            End If


        Case 24
            'Center Justified
            If Me.ActiveMdiChild Is Nothing Then
                Return
            End If
            If Me.ActiveMdiChild.Name = "Data_Table" Then
                Dim DataTable As Data_Table
                DataTable = CType(Me.ActiveMdiChild, Data_Table)
                Dim CellRange As CellRange = DataTable.DataTable.Selection
                Dim cellStyle As CellStyle = DataTable.DataTable.Styles.Focus
                cellStyle.TextAlign = TextAlignEnum.CenterCenter
                CellRange.StyleNew.TextAlign = cellStyle.TextAlign

            End If

        Case 25
            'Right Justified
            If Me.ActiveMdiChild Is Nothing Then
                Return
            End If
            If Me.ActiveMdiChild.Name = "Data_Table" Then
                Dim DataTable As Data_Table
                DataTable = CType(Me.ActiveMdiChild, Data_Table)
                Dim CellRange As CellRange = DataTable.DataTable.Selection
                Dim cellStyle As CellStyle = DataTable.DataTable.Styles.Focus
                cellStyle.TextAlign = TextAlignEnum.RightCenter
                CellRange.StyleNew.TextAlign = cellStyle.TextAlign

            End If

        End Select
    End Sub

#End Region

    Private Sub mnuFileSave_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs) Handles mnuFileSave.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If
        Dim SaveAsDlg As New SaveFileDialog
        Dim DataTable As New Data_Table
        If Me.ActiveMdiChild.Name = "Data_Table" Then
            DataTable = CType(Me.ActiveMdiChild, Data_Table)

            If myFileName Is Nothing Then
                With SaveAsDlg
                    .FileName = ""
                    .Filter = "Comma Separated (*.csv)|*.csv|All files (*.*)|*.*"
                    .FilterIndex = 1
                    If .ShowDialog() = DialogResult.Cancel Then Return
                    DataTable.DataTable.SaveGrid(SaveAsDlg.FileName, FileFormatEnum.     ↙
    TextComma, True)
                End With
                myFileName = SaveAsDlg.FileName
            End If
            DataTable.DataTable.SaveGrid(myFileName, FileFormatEnum.TextComma, True)
        End If

    End Sub

    Private Sub doc_NewPageSetup(ByVal sender As C1.C1PrintDocument.C1PrintDocument, ByVal↙
     e As C1.C1PrintDocument.NewPageSetupEventArgs) Handles doc.NewPageSetup 'C1Document1.↙
    NewPageStarted.NewPageSetup
        If Me.doc.CurrentPage = 2 Then
            With Me.doc.PageHeader
                .RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Right
                .RenderText.Text = "Header - Page [@@PageNo@@] of [@@PageCount@@]"
                .Height = 1
            End With
        End If
    End Sub


    Private Sub mnuFilePrint_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs) Handles mnuFilePrint.Click
```

```
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If


        If Me.ActiveMdiChild.Name = "Text_Output" Then
            Dim TextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output)
            Dim text As String = TextOutput.InputText.ToString
            Dim s As C1.C1PrintDocument.C1DocStyle
            Dim doc As New C1PrintDocument
            With Me.doc
                .Style.Font = New Font("Times New Roman", 12, FontStyle.Regular)
                With .PageHeader
                    '.RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.   ↙
    Right
                    '.RenderText.Text = "Header - Page [@@PageNo@@] of [@@PageCount@@]"
                    .Height = 0
                End With
                With .PageFooter
                    .RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.    ↙
    Right
                    .RenderText.Style.TextAlignVert = C1.C1PrintDocument.AlignVertEnum.    ↙
    Bottom
                    .RenderText.Text = "Footer - Page [@@PageNo@@] of [@@PageCount@@]"
                End With
                .StartDoc()
                .Style.TextColor = Color.Black
                '.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Justify
                .RenderBlockText(text)
                .Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Left
                .EndDoc()
            End With

            Dim aprev As New Final_Report
            aprev.C1PrintPreview1.Document = Me.doc
            aprev.ShowDialog()
            aprev.Dispose()

        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table = CType(Me.ActiveMdiChild, Data_Table)
            'Me.InternalPrintGrid(DataTable.DataTable)

            'Count the number of filled in columns (i.e. how many variables).
            Dim k, l, m As Integer
            Dim ColumnData As CellRange
            Dim AdjacentColumnData As CellRange
            Dim rel As New Regex("[0-9]")
            For k = 3 To CType(DataTable.DataTable.Cols.Count, Integer) - 2
                ColumnData = DataTable.DataTable.GetCellRange(1, k, CType(DataTable.    ↙
    DataTable.Rows.Count, Integer) - 1, k)
                'provide a counter to make sure all columns are contiguous
                AdjacentColumnData = DataTable.DataTable.GetCellRange(1, k + 1, CType(    ↙
    DataTable.DataTable.Rows.Count, Integer) - 1, k + 1)
                If Not rel.Matches(ColumnData.Clip).Count = 0 Then
                    l = l + 1
                End If
                'count if columns are not adjacent (i.e. any empty columns in between)
                If Not rel.Matches(ColumnData.Clip).Count = 0 And Not rel.Matches(    ↙
    AdjacentColumnData.Clip).Count = 0 Then
                    m = m + 1
                End If
            Next
            'Count last column if it has data in it
            k = k + 1
            If Not rel.Matches(ColumnData.Clip).Count = 0 Then
                l = l + 1
            End If

            Dim Replicates As Integer = CType(DataTable.Replicates, Integer)
            If Replicates = Nothing Then
                Dim ReplicateCells As CellRange
                ReplicateCells = DataTable.DataTable.GetCellRange(1, 2, CType(DataTable.   ↙
    DataTable.Rows.Count - 1, Integer), 2)
                Dim maxReplicate As Integer
                maxReplicate = CType(DataTable.DataTable.Aggregate(AggregateEnum.Max,      ↙
    ReplicateCells, AggregateFlags.None), Integer)
                Replicates = maxReplicate

            End If

            Dim endCell As Integer
            Dim SampleCells As CellRange
            For m = 1 To DataTable.DataTable.Rows.Count - 1 Step Replicates
                If CType(DataTable.DataTable(m, 1), String) = "" Then
                    endCell = m
                    m = DataTable.DataTable.Rows.Count
                End If
            Next

            Dim rows, columns As Integer
            For rows = 0 To endCell - 1
                DataTable.DataTable.Rows(rows).Visible = True
            Next
            For rows = endCell To DataTable.DataTable.Rows.Count - 1
                DataTable.DataTable.Rows(rows).Visible = False
            Next

            For columns = 3 + 1 To DataTable.DataTable.Cols.Count - 1
                DataTable.DataTable.Cols(columns).Visible = False
            Next

            'PUT IN TO TEST FORMATTING
            Dim doc As New C1PrintDocument
            currentGrid = DataTable.DataTable
            MakeDoc(Me.doc, Nothing)
            'MakeFlexPrintDoc(Me.doc, Nothing)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf MakeDoc)
            aprev.C1PrintPreview1.Document = Me.doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf MakeDoc↙
    )
            currentGrid = Nothing
            aprev.Dispose()

            For rows = endCell To DataTable.DataTable.Rows.Count - 1
                DataTable.DataTable.Rows(rows).Visible = True
            Next

            For columns = 3 + 1 To DataTable.DataTable.Cols.Count - 1
                DataTable.DataTable.Cols(columns).Visible = True
            Next

        End If

        If Me.ActiveMdiChild.Name = "Text_Output" Then
            Dim myTextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output)

        End If

        If Me.ActiveMdiChild.Name = "barChart" Then
```

```
            Dim barChart As barChart = CType(Me.ActiveMdiChild, barChart)
            Dim doc As New C1PrintDocument
            Doc2D_bar(doc, New GenerateEventArgs)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_bar)
            aprev.C1PrintPreview1.Document = doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2    ↙
    D_bar)
            aprev.Dispose()
            'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)


        End If

        If Me.ActiveMdiChild.Name = "chartDendrogram" Then
            Dim myDendrogram As chartDendrogram = CType(Me.ActiveMdiChild, chartDendrogram↙
    )
            Dim doc As New C1PrintDocument
            Doc2D_dendrogram(doc, New GenerateEventArgs)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2      ↙
    D_dendrogram)
            aprev.C1PrintPreview1.Document = doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2    ↙
    D_dendrogram)
            aprev.Dispose()
            'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)
            'myDendrogram.chDendrogram.PrintChart(PrintScaleEnum.ScaleToFit)
        End If

        If Me.ActiveMdiChild.Name = "Plot" Then
            Dim myPlot As Plot = CType(Me.ActiveMdiChild, Plot)
            Dim doc As New C1PrintDocument
            Doc2D_Plot(doc, New GenerateEventArgs)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_Plot↙
    )
            aprev.C1PrintPreview1.Document = doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2    ↙
    D_Plot)
            aprev.Dispose()
            'myPlot.chartPCA.PrintChart(PrintScaleEnum.ScaleToFit)
        End If


    End Sub

    Private Sub mnuDataProcessManova_Click(ByVal sender As System.Object, ByVal e As       ↙
    System.EventArgs) Handles mnuDataProcessManova.Click
        If Me.ActiveMdiChild Is Nothing Then
            MessageBox.Show("You have no open data tables with data to process", "Error", ↙
    MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If
        If Me.ActiveMdiChild.Name <> "Data_Table" Then
            MessageBox.Show("You must have a Data Table as the active window to process    ↙
    data from", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If


        Dim DataTable As New Data_Table
        DataTable = CType(Me.ActiveMdiChild, Data_Table)
        'Send DataTable to manova class
        Dim myManovaOutput As New manova(DataTable)
        'Send results to Text Output

        If myManovaOutput.no_Select = False Then
            Return
        End If
        Dim myManovaTextOutput As New Text_Output
        With myManovaTextOutput
            .MdiParent = Me
            .Text = DataTable.TableName & " Manova Output " & Date.Now
            .Show()
            .InputText = myManovaOutput.rich_Text
            .dataReport.Text = myManovaOutput.rich_Text
        End With

    End Sub

    Private Sub mnuDataProcessPCA_Click(ByVal sender As System.Object, ByVal e As System. ↙
    EventArgs) Handles mnuDataProcessPCA.Click

        Dim myPCA_Output As New PCA_output.PCA_output_data
        Dim myManova As New manovaexpandtjb.expandtable
        If Me.ActiveMdiChild Is Nothing Then
            MessageBox.Show("You have no open data tables with data to process", "Error", ↙
    MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If
        If Me.ActiveMdiChild.Name <> "Data_Table" Then
            MessageBox.Show("You must have a Data Table as the active window to process  ↙
    data from", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If

        Dim DataTable As New Data_Table
        DataTable = CType(Me.ActiveMdiChild, Data_Table)

        'Send Table to pca class
        Dim myPCAOutput As New pca(DataTable)
        'Send output to Text and graphs
        If myPCAOutput.no_Select = False Then
            Return
        End If
        Dim myPCATextOutput As New Text_Output
        myPCATextOutput.Inputnewdata = CType(myPCAOutput.TempData, Array)
        With myPCATextOutput
            .MdiParent = Me
            .Text = DataTable.TableName & " PCA Data Output " & Date.Now
            .Show()
            .InputText = myPCAOutput.RichText
            .dataReport.Text = myPCAOutput.RichText
        End With
        'Send variance data to barCHart
        Dim BarChart As New barChart
        BarChart.Input_data = CType(myPCAOutput.NewVariances, Array)
        BarChart.Samples = myPCAOutput.Samples
        BarChart.Variables = myPCAOutput.Variables
        BarChart.SampleNames = CType(myPCAOutput.SelectedSamples, Array)
        With BarChart
            .MdiParent = Me
            .Text = DataTable.TableName & " Variances"
            .Show()
        End With
        'Send 1st two components to plot
        Dim Plot As New Plot
        Plot.Input_data = CType(myPCAOutput.TempData, Array)
        Plot.Samples = myPCAOutput.Samples
        Plot.Variables = myPCAOutput.Variables
        Plot.SampleNames = CType(myPCAOutput.SelectedSamples, Array)
        With Plot
            .MdiParent = Me
            .Text = DataTable.TableName & " Component Loadings"
            .Show()
        End With



    End Sub

    Private Sub mnuDataProcessCluster_Click(ByVal sender As System.Object, ByVal e As     ↙
System.EventArgs) Handles mnuDataProcessCluster.Click
        If Me.ActiveMdiChild Is Nothing Then
            MessageBox.Show("You have no open data tables with data to process", "Error", ↙
MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If
        If Me.ActiveMdiChild.Name <> "Data_Table" Then
            MessageBox.Show("You must have a Data Table as the active window to process   ↙
data from", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If



        Dim DataTable As New Data_Table
        DataTable = CType(Me.ActiveMdiChild, Data_Table)
        'Run Cluster class
        Dim myCluster As New cluster(DataTable)
        If myCluster.no_Select = False Then
            Return
        End If
        'Send data to txt Output
        Dim myClusterTextOutput As New Text_Output
        myClusterTextOutput.Inputnewdata = CType(myCluster.TempData, Array)
        With myClusterTextOutput
            .Text = DataTable.TableName & " Dendrogram Output " & Date.Now
            .Show()
            .MdiParent = Me
            .InputText = myCluster.RichText
            .dataReport.Text = myCluster.RichText
        End With
        'Send data to dendrogram
        Dim Dendrogram As New chartDendrogram
        Dendrogram.Input_data = CType(myCluster.TempData, Array)
        Dendrogram.Samples = myCluster.Samples
        Dendrogram.Variables = myCluster.Variables
        Dendrogram.SampleNames = CType(myCluster.SelectedSamples, Array)
        Dendrogram.AxisLabels = CType(myCluster.AxisLabel, Array)
        With Dendrogram
            .MdiParent = Me
            .Text = DataTable.TableName & " Dendrogram"
            .Show()

        End With


    End Sub

    Private Sub mnuFormatCellsColor_Click(ByVal sender As System.Object, ByVal e As System↙
.EventArgs) Handles mnuFormatCellsColor.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
```

```
            Dim DataTable As Data_Table
            Dim SelectedColor As Color
            DataTable = CType(Me.ActiveMdiChild, Data_Table)
            Dim Selection As CellRange
            Selection = DataTable.DataTable.Selection
            Dim ColorDlg As New ColorDialog
            If ColorDlg.ShowDialog = DialogResult.OK Then
                SelectedColor = ColorDlg.Color
                Selection.StyleNew.BackColor = SelectedColor
            End If
        End If

    End Sub


    Sub PrintDocumentPages(ByVal firstPage As Integer, ByVal lastPage As Integer)
        Me.currPage = firstPage
        Me.lastPage = lastPage
        Me.PrintDoc = New PrintDocument

        Try
            PrintDoc.Print()
        Catch ex As Exception
            MessageBox.Show(ex.Message, "Print Error")
        End Try

    End Sub

    Private Sub PrintDoc_PrintPage(ByVal sender As Object, ByVal e As System.Drawing.      ↙
    Printing.PrintPageEventArgs) Handles PrintDoc.PrintPage

    End Sub


    Private Sub mnuFormatChart_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs) Handles mnuFormatChart.Click
        If Me.ActiveMdiChild Is Nothing Then
            Return
        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Return
        End If

        If Me.ActiveMdiChild.Name = "barChart" Then
            Dim barChart As barChart = CType(Me.ActiveMdiChild, barChart)
            barChart.chartBar.ShowProperties()
        End If

        If Me.ActiveMdiChild.Name = "chartDendrogram" Then
            Dim myDendrogram As chartDendrogram = CType(Me.ActiveMdiChild, chartDendrogram↙
    )
            myDendrogram.chDendrogram.ShowProperties()
        End If

        If Me.ActiveMdiChild.Name = "Plot" Then
            Dim myPlot As Plot = CType(Me.ActiveMdiChild, Plot)
            myPlot.chartPCA.ShowProperties()
        End If
    End Sub

    Private Sub FilePrintPreview_Click(ByVal sender As System.Object, ByVal e As System.   ↙
    EventArgs) Handles FilePrintPreview.Click


        If Me.ActiveMdiChild Is Nothing Then
```

```
            Return
        End If

        If Me.ActiveMdiChild.Name = "Text_Output" Then
            Dim TextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output)
            Dim text As String = TextOutput.InputText.ToString
            Dim s As C1.C1PrintDocument.C1DocStyle
            Dim doc As New C1PrintDocument
            With Me.doc
                .Style.Font = New Font("Times New Roman", 12, FontStyle.Regular)
                With .PageHeader
                    '.RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.   ↙
    Right
                    '.RenderText.Text = "Header - Page [@@PageNo@@] of [@@PageCount@@]"
                    .Height = 0
                End With
                With .PageFooter
                    .RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.   ↙
    Right
                    .RenderText.Style.TextAlignVert = C1.C1PrintDocument.AlignVertEnum.   ↙
    Bottom
                    .RenderText.Text = "Footer - Page [@@PageNo@@] of [@@PageCount@@]"
                End With
                .StartDoc()
                .Style.TextColor = Color.Black
                '.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Justify
                .RenderBlockText(text)
                .Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Left
                .EndDoc()
            End With

            Dim aprev As New Final_Report
            aprev.C1PrintPreview1.Document = Me.doc
            aprev.ShowDialog()
            aprev.Dispose()

        End If

        If Me.ActiveMdiChild.Name = "Data_Table" Then
            Dim DataTable As Data_Table = CType(Me.ActiveMdiChild, Data_Table)
            'Me.InternalPrintGrid(DataTable.DataTable)

            'Count the number of filled in columns (i.e. how many variables).
            Dim k, l, m As Integer
            Dim ColumnData As CellRange
            Dim AdjacentColumnData As CellRange
            Dim re1 As New Regex("[0-9]")
            For k = 3 To CType(DataTable.DataTable.Cols.Count, Integer) - 2
                ColumnData = DataTable.DataTable.GetCellRange(1, k, CType(DataTable.   ↙
    DataTable.Rows.Count, Integer) - 1, k)
                'provide a counter to make sure all columns are contiguous
                AdjacentColumnData = DataTable.DataTable.GetCellRange(1, k + 1, CType(   ↙
    DataTable.DataTable.Rows.Count, Integer) - 1, k + 1)
                If Not re1.Matches(ColumnData.Clip).Count = 0 Then
                    l = l + 1
                End If
                'count if columns are not adjacent (i.e. any empty columns in between)
                If Not re1.Matches(ColumnData.Clip).Count = 0 And Not re1.Matches(   ↙
    AdjacentColumnData.Clip).Count = 0 Then
                    m = m + 1
                End If
            Next
            'Count last column if it has data in it
            k = k + 1
            If Not re1.Matches(ColumnData.Clip).Count = 0 Then
                l = l + 1
            End If
            Dim Replicates As Integer = CType(DataTable.Replicates, Integer)
            If Replicates = Nothing Then
                Dim ReplicateCells As CellRange
                ReplicateCells = DataTable.DataTable.GetCellRange(1, 2, CType(DataTable.  ↙
    DataTable.Rows.Count - 1, Integer), 2)
                Dim maxReplicate As Integer
                maxReplicate = CType(DataTable.DataTable.Aggregate(AggregateEnum.Max,     ↙
    ReplicateCells, AggregateFlags.None), Integer)
                Replicates = maxReplicate

            End If

            Dim endCell As Integer
            Dim SampleCells As CellRange
            For m = 1 To DataTable.DataTable.Rows.Count - 1 Step Replicates
                If CType(DataTable.DataTable(m, 1), String) = "" Then
                    endCell = m
                    m = DataTable.DataTable.Rows.Count
                End If
            Next

            Dim rows, columns As Integer
            For rows = 0 To endCell - 1
                DataTable.DataTable.Rows(rows).Visible = True
            Next
            For rows = endCell To DataTable.DataTable.Rows.Count - 1
                DataTable.DataTable.Rows(rows).Visible = False
            Next

            For columns = 3 + 1 To DataTable.DataTable.Cols.Count - 1
                DataTable.DataTable.Cols(columns).Visible = False
            Next

            'PUT IN TO TEST FORMATTING
            Dim doc As New C1PrintDocument
            currentGrid = DataTable.DataTable
            MakeDoc(Me.doc, Nothing)
            'MakeFlexPrintDoc(Me.doc, Nothing)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf MakeDoc)
            aprev.C1PrintPreview1.Document = Me.doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf MakeDoc↙
    )
            currentGrid = Nothing
            aprev.Dispose()

            For rows = endCell To DataTable.DataTable.Rows.Count - 1
                DataTable.DataTable.Rows(rows).Visible = True
            Next

            For columns = 3 + 1 To DataTable.DataTable.Cols.Count - 1
                DataTable.DataTable.Cols(columns).Visible = True
            Next

        End If


        If Me.ActiveMdiChild.Name = "barChart" Then
            Dim barChart As barChart = CType(Me.ActiveMdiChild, barChart)
            Dim doc As New C1PrintDocument
            Doc2D_bar(doc, New GenerateEventArgs)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_bar)
            aprev.C1PrintPreview1.Document = doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2
    D_bar)
            aprev.Dispose()
            'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)


        End If

        If Me.ActiveMdiChild.Name = "chartDendrogram" Then
            Dim myDendrogram As chartDendrogram = CType(Me.ActiveMdiChild, chartDendrogram
    )
            Dim doc As New C1PrintDocument
            Doc2D_dendrogram(doc, New GenerateEventArgs)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2
    D_dendrogram)
            aprev.C1PrintPreview1.Document = doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2
    D_dendrogram)
            aprev.Dispose()
            'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)
            'myDendrogram.chDendrogram.PrintChart(PrintScaleEnum.ScaleToFit)
        End If

        If Me.ActiveMdiChild.Name = "Plot" Then
            Dim myPlot As Plot = CType(Me.ActiveMdiChild, Plot)
            Dim doc As New C1PrintDocument
            Doc2D_Plot(doc, New GenerateEventArgs)
            Dim aprev As New Final_Report
            AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_Plot
    )
            aprev.C1PrintPreview1.Document = doc
            aprev.ShowDialog()
            RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2
    D_Plot)
            aprev.Dispose()
            'myPlot.chartPCA.PrintChart(PrintScaleEnum.ScaleToFit)

        End If


    End Sub

    Private Sub Doc2D_Plot(ByVal doc As C1PrintDocument, ByVal e As GenerateEventArgs)
        Dim C1Chart1Raw As Plot = CType(Me.ActiveMdiChild, Plot)
        Dim C1Chart1 As C1.Win.C1Chart.C1Chart = C1Chart1Raw.chartPCA
        With doc
            .DefaultUnit = UnitTypeEnum.Mm
            .StartDoc()
            '.RenderBlockText("Chart", 50, 50, Nothing)
            Dim ww As Double = (CType(.BodyAreaSize.Width, Double)) * 0.9
            .RenderBlockC1Printable(C1Chart1, (.BodyAreaSize.Width * 0.9))
            .CanChangePageMetrics()
            .RenderBlockGraphicsBegin()
            .EndDoc()
        End With
    End Sub

    Private Sub Doc2D_dendrogram(ByVal doc As C1PrintDocument, ByVal e As
    GenerateEventArgs)
        Dim C1Chart1Raw As chartDendrogram = CType(Me.ActiveMdiChild, chartDendrogram)
        Dim C1Chart1 As C1.Win.C1Chart.C1Chart = C1Chart1Raw.chDendrogram
        With doc
            .DefaultUnit = UnitTypeEnum.Mm
            .StartDoc()
            '.RenderBlockText("Chart", 50, 50, Nothing)
            Dim ww As Double = (CType(.BodyAreaSize.Width, Double)) * 0.9
            .RenderBlockC1Printable(C1Chart1, (.BodyAreaSize.Width * 0.9))
            .CanChangePageMetrics()
            .RenderBlockGraphicsBegin()
            .EndDoc()
        End With
    End Sub

    Private Sub Doc2D_bar(ByVal doc As C1PrintDocument, ByVal e As GenerateEventArgs)
        Dim C1Chart1Raw As barChart = CType(Me.ActiveMdiChild, barChart)
        Dim C1Chart1 As C1.Win.C1Chart.C1Chart = C1Chart1Raw.chartBar
        With doc
            .DefaultUnit = UnitTypeEnum.Mm
            .StartDoc()
            '.RenderBlockText("Chart", 50, 50, Nothing)
            Dim ww As Double = (CType(.BodyAreaSize.Width, Double)) * 0.9
            .RenderBlockC1Printable(C1Chart1, (.BodyAreaSize.Width * 0.9))
            .CanChangePageMetrics()
            .RenderBlockGraphicsBegin()
            .EndDoc()
        End With
    End Sub

    Private Sub HelpProvider1_Disposed(ByVal sender As Object, ByVal e As System.EventArgs↙
    ) Handles HelpProvider1.Disposed

    End Sub


    Private Sub mnuEditUndo_Click(ByVal sender As System.Object, ByVal e As System.          ↙
    EventArgs) Handles mnuEditUndo.Click
        Dim DataTable As Data_Table = DirectCast(Me.ActiveMdiChild, Data_Table)

    End Sub

    Private Sub mnuDataStatistics_Click(ByVal sender As System.Object, ByVal e As System. ↙
    EventArgs) Handles mnuDataStatistics.Click
        Dim Report As New Report_Document
        Report.Show()

    End Sub

End Class
```

```
Public Class About
    Inherits System.Windows.Forms.Form

 Windows Form Designer generated code

    Private Sub About_Load(ByVal sender As System.Object, ByVal e As System.EventArgs)     ↙
    Handles MyBase.Load

    End Sub

    Private Sub About_MdiChildActivate(ByVal sender As Object, ByVal e As System.         ↙
    EventArgs) Handles MyBase.MdiChildActivate

    End Sub

    Private Sub Label3_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)  ↙
    Handles Label3.Click

    End Sub
End Class
```

```
Imports System
Imports System.Reflection
Imports System.Runtime.InteropServices

' General Information about an assembly is controlled through the following
' set of attributes. Change these attribute values to modify the information
' associated with an assembly.

' Review the values of the assembly attributes

<Assembly: AssemblyTitle("")>
<Assembly: AssemblyDescription("")>
<Assembly: AssemblyCompany("")>
<Assembly: AssemblyProduct("")>
<Assembly: AssemblyCopyright("")>
<Assembly: AssemblyTrademark("")>
<Assembly: CLSCompliant(True)>

'The following GUID is for the ID of the typelib if this project is exposed to COM
<Assembly: Guid("3648409D-0530-443F-8B55-1698FC969708")>

' Version information for an assembly consists of the following four values:
'
'      Major Version
'      Minor Version
'      Build Number
'      Revision
'
' You can specify all the values or you can default the Build and Revision Numbers
' by using the '*' as shown below:

<Assembly: AssemblyVersion("1.0.*")>
```

```
Imports C1.Win.C1Chart
Imports System.Math
Imports System.Drawing.Imaging
Imports System.Drawing.Printing
Imports C1.Win.C1PrintPreview
Imports C1.C1PrintDocument

Public Class barChart
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents chartBar As C1.Win.C1Chart.C1Chart
    Friend WithEvents MenuItem3 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem6 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxCopy As System.Windows.Forms.MenuItem
    Friend WithEvents ctxSaveAs As System.Windows.Forms.MenuItem
    Friend WithEvents ctxPrint As System.Windows.Forms.MenuItem
    Friend WithEvents ctxExit As System.Windows.Forms.MenuItem
    Friend WithEvents ContextMenuBarChart As System.Windows.Forms.ContextMenu
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.  ↙
    ResourceManager(GetType(barChart))
        Me.chartBar = New C1.Win.C1Chart.C1Chart
        Me.ContextMenuBarChart = New System.Windows.Forms.ContextMenu
        Me.ctxCopy = New System.Windows.Forms.MenuItem
        Me.ctxSaveAs = New System.Windows.Forms.MenuItem
        Me.MenuItem3 = New System.Windows.Forms.MenuItem
        Me.ctxPrint = New System.Windows.Forms.MenuItem
        Me.MenuItem6 = New System.Windows.Forms.MenuItem
        Me.ctxExit = New System.Windows.Forms.MenuItem
        CType(Me.chartBar, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'chartBar
        '
        Me.chartBar.BackColor = System.Drawing.Color.White
        Me.chartBar.DataSource = Nothing
        Me.chartBar.Dock = System.Windows.Forms.DockStyle.Fill
        Me.chartBar.Location = New System.Drawing.Point(0, 0)
        Me.chartBar.Name = "chartBar"
        Me.chartBar.PropBag = "<?xml version=""1.0""?><Chart2DPropBag Version="""">
    <StyleCollection><NamedStyle><Par" & _
        "entName>Area</ParentName><StyleData>Border=None,Black,1;</StyleData><Name>PlotAr"
     & _
        "ea</Name></NamedStyle><NamedStyle><ParentName>Legend.default</ParentName><StyleD"
     & _
        "ata /><Name>Legend</Name></NamedStyle><NamedStyle><ParentName>Control</ParentNam"
     & _
        "e><StyleData>Border=None,Black,1;</StyleData><Name>Footer</Name></NamedStyle><Na"
     & _
        "medStyle><ParentName>Area.default</ParentName><StyleData /><Name>Area</Name></Na"
     & _
        "medStyle><NamedStyle><ParentName>Control.default</ParentName><StyleData>BackColo"
     & _
        "r=White;</StyleData><Name>Control</Name></NamedStyle><NamedStyle><ParentName>Are"
     & _
        "a</ParentName><StyleData>Rotation=Rotate0;Border=None,Transparent,1;AlignHorz=Ce"
     & _
        "nter;BackColor=Transparent;Opaque=False;AlignVert=Bottom;</StyleData><Name>AxisX"
     & _
        "</Name></NamedStyle><NamedStyle><ParentName>Area</ParentName><StyleData>Rotation"
     & _
        "=Rotate270;Border=None,Transparent,1;AlignHorz=Near;BackColor=Transparent;Opaque"
     & _
        "=False;AlignVert=Center;</StyleData><Name>AxisY</Name></NamedStyle><NamedStyle><"
     & _
        "ParentName>LabelStyleDefault.default</ParentName><StyleData /><Name>LabelStyleDe"
     & _
        "fault</Name></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>"
     & _
        "Border=None,Black,1;Wrap=False;AlignVert=Top;</StyleData><Name>Legend.default</N"
     & _
        "ame></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>Border=N"
     & _
        "one,Black,1;BackColor=Transparent;</StyleData><Name>LabelStyleDefault.default</N"
     & _
        "ame></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>Border=N"
     & _
        "one,Black,1;Font=Microsoft Sans Serif, 8.25pt;</StyleData><Name>Header</Name></N"
     & _
        "amedStyle><NamedStyle><ParentName /><StyleData>ForeColor=ControlText;Border=None"
     & _
        ",Black,1;BackColor=Control;</StyleData><Name>Control.default</Name></NamedStyle>"
     & _
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     & _
        "e,Transparent,1;AlignHorz=Far;BackColor=Transparent;AlignVert=Center;</StyleData"
     & _
        "><Name>AxisY2</Name></NamedStyle><NamedStyle><ParentName>Control</ParentName><St"
     & _
        "yleData>Border=None,Black,1;AlignVert=Top;</StyleData><Name>Area.default</Name><"
     & _
        "/NamedStyle></StyleCollection><Header Compass=""North""><Text>Percent Variance
    Exp" & _
        "lained</Text></Header><Footer Compass=""South""><Text /></Footer><Legend Visible=
    """ & _
        "False"" Compass=""East""><Text /></Legend><ChartArea /><Axes><Axis UnitMajor=""1
    "" Un" & _
        "itMinor=""0.5"" AutoMajor=""True"" AutoMinor=""True"" AutoMax=""True"" AutoMin="
    "True"" Ma" & _
        "x=""5"" Min=""1"" _onTop=""0"" Compass=""South""><GridMajor AutoSpace=""True""
    Color=""Ligh" & _
        "tGray"" Pattern=""Dash"" Thickness=""1"" /><GridMinor AutoSpace=""True"" Color="
    "LightGr" & _
        "ay"" Pattern=""Dash"" Thickness=""1"" /><Text /></Axis><Axis UnitMajor=""2""
    UnitMinor=" & _
        """1"" AutoMajor=""True"" AutoMinor=""True"" AutoMax=""True"" AutoMin=""True"" Max
```

```
=""26"" Min" & _
    "=""8"" _onTop=""0"" Compass=""West""><GridMajor AutoSpace=""True"" Color="    ↙
"LightGray"" Pat" & _
    "tern=""Dash"" Thickness=""1"" /><GridMinor AutoSpace=""True"" Color=""LightGray""↙
 Patter" & _
    "n=""Dash"" Thickness=""1"" /><Text /></Axis><Axis UnitMajor=""0"" UnitMinor=""0""↙
 AutoMa" & _
    "jor=""True"" AutoMinor=""True"" AutoMax=""True"" AutoMin=""True"" Max=""0"" Min= ↙
""0"" _onTop" & _
    "=""0"" Compass=""East""><GridMajor AutoSpace=""True"" Color=""LightGray"" Pattern↙
=""Dash""" & _
    " Thickness=""1"" /><GridMinor AutoSpace=""True"" Color=""LightGray"" Pattern="   ↙
"Dash"" Th" & _
    "ickness=""1"" /><Text /></Axis></Axes><ChartGroupsCollection><ChartGroup>        ↙
<ShowOutl" & _
    "ine>True</ShowOutline><HiLoData>FillFalling=True,FillTransparent=True,FullWidth="↙
 & _
    "False,ShowClose=True,ShowOpen=True</HiLoData><ChartType>Bar</ChartType><Name>Gro"↙
 & _
    "up1</Name><Bar>ClusterOverlap=0,ClusterWidth=80</Bar><DataSerializer Hole=""3.402↙
" & _
    "8234663852886E+38"" DefaultSet=""True""><DataSeriesCollection>                   ↙
<DataSeriesSerializer" & _
    "><SeriesLabel>Variances</SeriesLabel><DataTypes>Double;Double;Double;Double;Doub"↙
 & _
    "le</DataTypes><DataFields>;;;;</DataFields><SymbolStyle Color=""Coral"" Shape="  ↙
"Box" & _
    """ /><X /><Y1 /><Y /><LineStyle Color=""Blue"" Pattern=""Solid"" Thickness=""1"" ↙
/><Tag" & _
    " /><Y2 /><Y3 /></DataSeriesSerializer></DataSeriesCollection></DataSerializer><B"↙
 & _
    "ubble>EncodingMethod=Diameter,MaximumSize=20,MinimumSize=5</Bubble><Pie>OtherOff"↙
 & _
    "set=0,Start=0</Pie><Polar>Degrees=True,PiRatioAnnotations=True,Start=0</Polar><S"↙
 & _
    "tacked>False</Stacked><Radar>Degrees=True,Filled=False,Start=0</Radar><Visible>T"↙
 & _
    "rue</Visible></ChartGroup><ChartGroup><ShowOutline>True</ShowOutline><HiLoData>F"↙
 & _
    "illFalling=True,FillTransparent=True,FullWidth=False,ShowClose=True,ShowOpen=Tru"↙
 & _
    "e</HiLoData><ChartType>XYPlot</ChartType><Name>Group2</Name><Bar>ClusterOverlap="↙
 & _
    "0,ClusterWidth=50</Bar><DataSerializer Hole=""3.4028234663852886E+38"" /><Bubble>↙
E" & _
    "ncodingMethod=Diameter,MaximumSize=20,MinimumSize=5</Bubble><Pie>OtherOffset=0,S"↙
 & _
    "tart=0</Pie><Polar>Degrees=True,PiRatioAnnotations=True,Start=0</Polar><Stacked>"↙
 & _
    "False</Stacked><Radar>Degrees=True,Filled=False,Start=0</Radar><Visible>True</Vi"↙
 & _
    "sible></ChartGroup></ChartGroupsCollection></Chart2DPropBag>"
    Me.chartBar.Size = New System.Drawing.Size(422, 373)
    Me.chartBar.TabIndex = 0
    '
    'ContextMenuBarChart
    '
    Me.ContextMenuBarChart.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.↙
ctxCopy, Me.ctxSaveAs, Me.MenuItem3, Me.ctxPrint, Me.MenuItem6, Me.ctxExit})
    '
    'ctxCopy
    '
    Me.ctxCopy.Index = 0
    Me.ctxCopy.Text = "&Copy"
    '
    'ctxSaveAs
    '
```

```
        Me.ctxSaveAs.Index = 1
        Me.ctxSaveAs.Text = "Save &As"
        '
        'MenuItem3
        '
        Me.MenuItem3.Index = 2
        Me.MenuItem3.Text = "-"
        '
        'ctxPrint
        '
        Me.ctxPrint.Index = 3
        Me.ctxPrint.Text = "&Print"
        '
        'MenuItem6
        '
        Me.MenuItem6.Index = 4
        Me.MenuItem6.Text = "-"
        '
        'ctxExit
        '
        Me.ctxExit.Index = 5
        Me.ctxExit.Text = "E&xit"
        '
        'barChart
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(422, 373)
        Me.ContextMenu = Me.ContextMenuBarChart
        Me.Controls.Add(Me.chartBar)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.Name = "barChart"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen
        Me.Text = "barChart"
        CType(Me.chartBar, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private mySamples As Integer
    Private myVariables As Integer
    Private myInput_data As Array
    Private mySampleNames As Array
    Private myDataSeries As Integer

    Public Property Variables() As Integer
        Get
            Return myVariables
        End Get
        Set(ByVal Value As Integer)
            myVariables = Value
        End Set
    End Property

    Public Property Samples() As Integer
        Get
            Return mySamples
        End Get
        Set(ByVal Value As Integer)
            mySamples = Value
        End Set
    End Property

    Public Property Input_data() As Array
        Get
            Return myInput_data
        End Get
        Set(ByVal Value As Array)
            myInput_data = Value
        End Set
    End Property

    Public Property SampleNames() As Array
        Get
            Return mySampleNames
        End Get
        Set(ByVal Value As Array)
            mySampleNames = Value
        End Set
    End Property

    Public Property DataSeries() As Integer
        Get
            Return myDataSeries
        End Get
        Set(ByVal Value As Integer)
            myDataSeries = Value
        End Set
    End Property



    Private Sub mnuFileClose_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs)
        Me.Close()
    End Sub

    Private Sub chartBar_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles chartBar.Load

        Dim chartData As C1.Win.C1Chart.ChartDataSeries
        Dim chartDataXY As C1.Win.C1Chart.ChartData
        Dim AxisCounter As Integer = Input_data.Length
        Dim Counter As Integer = 0


        Dim xAxisData(AxisCounter - 1) As Double
        Dim yAxisDataPercent(AxisCounter - 1) As Double
        Dim sumVariance As Double

        For Counter = 0 To AxisCounter - 1
            sumVariance = sumVariance + CType(Input_data.GetValue(Counter), Double)
        Next

        For Counter = 0 To AxisCounter - 1
            xAxisData(Counter) = Counter + 1
            yAxisDataPercent(Counter) = (100 * CType(Input_data.GetValue(Counter),      ↙
    Double)) / sumVariance


        Next

        'Populate Chart
        chartBar.Style.Border.BorderStyle = C1.Win.C1Chart.BorderStyleEnum.Solid
        chartBar.Style.Border.Thickness = 1
        chartBar.ChartGroups(0).ChartData.SeriesList(0).X.CopyDataIn(xAxisData)
        chartBar.ChartGroups(0).ChartData.SeriesList(0).Y.CopyDataIn(yAxisDataPercent)
        chartBar.ChartArea.AxisX.Text = ControlChars.Lf + "Principal Component"
        chartBar.ChartArea.AxisY.Alignment = StringAlignment.Center
        chartBar.ChartArea.AxisY.Text = "Percent Variance Explained" + ControlChars.Lf + "↙
      "
        chartBar.Header.Style.Font = New Font("Arial", 10, FontStyle.Bold)
        chartBar.ChartArea.AxisX.TickMinor = TickMarksEnum.None
        'Determine the percent explained at each bar
        Dim percentExplained(Input_data.GetUpperBound(0)) As Double
        Dim totalVariance As Double
        Dim tempPercent(Input_data.GetUpperBound(0)) As Double
        For Counter = 0 To Input_data.GetUpperBound(0)
            totalVariance = totalVariance + CType(Input_data.GetValue(Counter), Double)
        Next
        For Counter = 0 To Input_data.GetUpperBound(0)
            tempPercent(Counter) = 100 * (CType(Input_data.GetValue(Counter), Double)) /  ↙
    totalVariance
            If Counter > 0 Then
                percentExplained(Counter) = percentExplained(Counter - 1) + tempPercent   ↙
    (Counter)
            ElseIf Counter = 0 Then
                percentExplained(Counter) = tempPercent(Counter)
            End If
            percentExplained(Counter) = Math.Round(percentExplained(Counter), 1)
        Next

        'Add data labels

        Dim cLabs As ChartLabels = chartBar.ChartLabels
        cLabs.DefaultLabelStyle.BackColor = Color.White
        cLabs.DefaultLabelStyle.Border.BorderStyle = BorderStyleEnum.Empty
        cLabs.DefaultLabelStyle.Border.Thickness = 0

        For Counter = 0 To percentExplained.GetUpperBound(0)
            Dim cLab As C1.Win.C1Chart.Label = cLabs.LabelsCollection.AddNewLabel()
            cLab.Text = percentExplained(Counter).ToString
            cLab.AttachMethod = AttachMethodEnum.DataIndex
            cLab.AttachMethodData.GroupIndex = 0
            cLab.AttachMethodData.SeriesIndex = 0
            cLab.AttachMethodData.PointIndex = Counter
            cLab.Connected = True
            cLab.Offset = 30
            cLab.Visible = True
            cLab.Compass = LabelCompassEnum.NorthEast
        Next


    End Sub

    Private Sub ctxCopy_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxCopy.Click
        Dim myChart As barChart = Me
        myChart.chartBar.SaveImage(ImageFormat.Emf)
    End Sub

    Private Sub ctxSaveAs_Click(ByVal sender As System.Object, ByVal e As System.        ↙
    EventArgs) Handles ctxSaveAs.Click
        Dim lastFilterIndex As Integer = 1
        Dim myChart As barChart = Me
        Dim sfg As New SaveFileDialog

        sfg.Filter = "Metafiles (*.emf)|*.emf|" + "Bmp files (*.bmp)|*.bmp|" + "Gif files ↙
    (*.gif)|*.gif|" + "Jpeg files (*.jpg;*.jpeg)|*.jpg;*.jpeg|" + "Png files (*.png)|*.png↙
    |" + "All graphic files (*.emf;*.bmp;*.gif;*.jpg;*.jpeg;*.png)|*.emf;*.bmp;*.gif;*.jpg↙
    ;*.jpeg;*.png"
        sfg.FilterIndex = lastFilterIndex
        sfg.OverwritePrompt = True
        sfg.CheckPathExists = True
        sfg.RestoreDirectory = False
        sfg.ValidateNames = True
        If sfg.ShowDialog() = DialogResult.OK Then
            Dim fn As String = sfg.FileName
            Dim indext As Integer = fn.LastIndexOf("."c)
            If indext < 0 Then
                indext = fn.Length + 1
                fn += ".emf"
            Else
                indext += 1
            End If
            Dim ext As String = fn.Substring(indext)
            Dim imgfmt As ImageFormat = Nothing

            Select Case ext
                Case "emf"
                    imgfmt = ImageFormat.Emf
                    myChart.chartBar.SaveImage(fn, imgfmt)

                Case "bmp"
                    imgfmt = ImageFormat.Bmp

                Case "gif"
                    imgfmt = ImageFormat.Gif

                Case "jpeg", "jpg"
                    imgfmt = ImageFormat.Jpeg

                Case "png"
                    imgfmt = ImageFormat.Png

                Case Else
                    Return
            End Select

            lastFilterIndex = sfg.FilterIndex

            If Not imgfmt.Equals(ImageFormat.Emf) Then
                Dim img As Image = myChart.chartBar.GetImage()
                img.Save(fn, imgfmt)
                img.Dispose()
            End If
        End If
        sfg.Dispose()
    End Sub

    Private Sub ctxExit_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxExit.Click
        Me.Close()
    End Sub

    Private Sub chartBar_Click(ByVal sender As Object, ByVal e As System.EventArgs)       ↙
    Handles chartBar.Click
        Me.Activate()
    End Sub

    Private Sub ctxPrint_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)↙
     Handles ctxPrint.Click
        Dim doc As New C1PrintDocument
        Doc2D_bar(doc, New GenerateEventArgs)
        Dim aprev As New Final_Report
        AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_bar)
        aprev.C1PrintPreview1.Document = doc
        aprev.ShowDialog()
        RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_bar)
        aprev.Dispose()
        'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)

    End Sub
    Private Sub Doc2D_bar(ByVal doc As C1PrintDocument, ByVal e As GenerateEventArgs)
        Dim C1Chart1Raw As barChart = Me
        Dim C1Chart1 As C1.Win.C1Chart.C1Chart = C1Chart1Raw.chartBar
        With doc
            .DefaultUnit = UnitTypeEnum.Mm
            .StartDoc()
            '.RenderBlockText("Chart", 50, 50, Nothing)
            Dim ww As Double = (CType(.BodyAreaSize.Width, Double)) * 0.9
            .RenderBlockC1Printable(C1Chart1, (.BodyAreaSize.Width * 0.9))
            .CanChangePageMetrics()
            .RenderBlockGraphicsBegin()
            .EndDoc()
        End With
    End Sub

End Class
```

```
Imports C1.Win.C1Chart
Imports System.Drawing.Imaging
Imports System.Drawing.Printing
Imports C1.C1PrintDocument

Public Class chartDendrogram
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents chDendrogram As C1.Win.C1Chart.C1Chart
    Friend WithEvents ctxCopy As System.Windows.Forms.MenuItem
    Friend WithEvents ctxSaveAs As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem3 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxPrint As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem6 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxExit As System.Windows.Forms.MenuItem
    Friend WithEvents ContextMenuDendrogram As System.Windows.Forms.ContextMenu
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.       ↙
    ResourceManager(GetType(chartDendrogram))
        Me.chDendrogram = New C1.Win.C1Chart.C1Chart
        Me.ContextMenuDendrogram = New System.Windows.Forms.ContextMenu
        Me.ctxCopy = New System.Windows.Forms.MenuItem
        Me.ctxSaveAs = New System.Windows.Forms.MenuItem
        Me.MenuItem3 = New System.Windows.Forms.MenuItem
        Me.ctxPrint = New System.Windows.Forms.MenuItem
        Me.MenuItem6 = New System.Windows.Forms.MenuItem
        Me.ctxExit = New System.Windows.Forms.MenuItem
        CType(Me.chDendrogram, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'chDendrogram
        '
        Me.chDendrogram.BackColor = System.Drawing.Color.White
        Me.chDendrogram.DataSource = Nothing
        Me.chDendrogram.Dock = System.Windows.Forms.DockStyle.Fill
        Me.chDendrogram.Location = New System.Drawing.Point(0, 0)
        Me.chDendrogram.Name = "chDendrogram"
        Me.chDendrogram.PropBag = "<?xml version=""1.0""?><Chart2DPropBag Version="""">      ↙
    <StyleCollection><NamedStyle><Par" & _
    "entName>Area</ParentName><StyleData>Border=None,Black,1;</StyleData><Name>PlotAr"↙
 & _
    "ea</Name></NamedStyle><NamedStyle><ParentName>Legend.default</ParentName><StyleD"↙
 & _
    "ata /><Name>Legend</Name></NamedStyle><NamedStyle><ParentName>Control</ParentNam"↙
 & _
    "e><StyleData>Border=None,Black,1;</StyleData><Name>Footer</Name></NamedStyle><Na"↙
 & _
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 & _
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 & _
    "nter;BackColor=Transparent;Opaque=False;AlignVert=Bottom;</StyleData><Name>AxisX"↙
 & _
    "</Name></NamedStyle><NamedStyle><ParentName>Area</ParentName><StyleData>Rotation"↙
 & _
    "=Rotate270;Border=None,Transparent,1;AlignHorz=Near;BackColor=Transparent;Opaque"↙
 & _
    "=False;AlignVert=Center;</StyleData><Name>AxisY</Name></NamedStyle><NamedStyle><"↙
 & _
    "ParentName>LabelStyleDefault.default</ParentName><StyleData /><Name>LabelStyleDe"↙
 & _
    "fault</Name></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>"↙
 & _
    "Border=None,Black,1;Wrap=False;AlignVert=Top;</StyleData><Name>Legend.default</N"↙
 & _
    "ame></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>Border=N"↙
 & _
    "one,Black,1;BackColor=Transparent;</StyleData><Name>LabelStyleDefault.default</N"↙
 & _
    "ame></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>Border=N"↙
 & _
    "one,Black,1;BackColor=Transparent;</StyleData><Name>Header</Name></NamedStyle><N"↙
 & _
    "amedStyle><ParentName /><StyleData>ForeColor=ControlText;Border=None,Black,1;Bac"↙
 & _
    "kColor=Control;</StyleData><Name>Control.default</Name></NamedStyle><NamedStyle>"↙
 & _
    "<ParentName>Area</ParentName><StyleData>Rotation=Rotate90;Border=None,Transparen"↙
 & _
    "t,1;AlignHorz=Far;BackColor=Transparent;AlignVert=Center;</StyleData><Name>AxisY"↙
 & _
    "2</Name></NamedStyle><NamedStyle><ParentName>Control</ParentName><StyleData>Bord"↙
 & _
    "er=None,Black,1;AlignVert=Top;</StyleData><Name>Area.default</Name></NamedStyle>"↙
 & _
    "</StyleCollection><Header Compass=""North""><Text>Sample Relatedness</Text></    ↙
Heade" & _
    "r><Footer Compass=""South""><Text /></Footer><Legend Visible=""False"" Compass=" ↙
"East" & _
    """"><Text /></Legend><ChartArea /><Axes><Axis UnitMajor=""1"" UnitMinor=""0.5""  ↙
AutoMa" & _
    "jor=""True"" AutoMinor=""True"" AutoMax=""True"" AutoMin=""True"" Max=""5"" Min= ↙
""1"" _onTop" & _
    "=""0"" Compass=""South""><GridMajor AutoSpace=""True"" Color=""LightGray""       ↙
Pattern=""Dash" & _
    """ Thickness=""1"" /><GridMinor AutoSpace=""True"" Color=""LightGray"" Pattern=" ↙
"Dash"" T" & _
    "hickness=""1"" /><Text /></Axis><Axis UnitMajor=""2"" UnitMinor=""1"" AutoMajor= ↙
""True""" & _
    " AutoMinor=""True"" AutoMax=""True"" AutoMin=""True"" Max=""26"" Min=""8"" _onTop↙
=""0"" Comp" & _
    "ass=""West""><GridMajor AutoSpace=""True"" Color=""LightGray"" Pattern=""Dash""  ↙
    Thicknes" & _
        "s=""1"" /><GridMinor AutoSpace=""True"" Color=""LightGray"" Pattern=""Dash""        ↙
    Thickness=""" & _
        "1"" /><Text /></Axis><Axis UnitMajor=""0"" UnitMinor=""0"" AutoMajor=""True""      ↙
    AutoMinor" & _
        "=""True"" AutoMax=""True"" AutoMin=""True"" Max=""0"" Min=""0"" _onTop=""0""      ↙
    Compass=""East"">" & _
        "<GridMajor AutoSpace=""True"" Color=""LightGray"" Pattern=""Dash"" Thickness=""1 ↙
    "" /><Gr" & _
        "idMinor AutoSpace=""True"" Color=""LightGray"" Pattern=""Dash"" Thickness=""1""   ↙
    /><Text " & _
        "/></Axis></Axes><ChartGroupsCollection><ChartGroup><ShowOutline>True</ShowOutlin"↙
     & _
        "e><HiLoData>FillFalling=True,FillTransparent=True,FullWidth=False,ShowClose=True"↙
     & _
        ",ShowOpen=True</HiLoData><ChartType>XYPlot</ChartType><Name>Group1</Name><Bar>Cl"↙
     & _
        "usterOverlap=0,ClusterWidth=50</Bar><DataSerializer Hole=""3.4028234663852886E+38↙
    " & _
        """ DefaultSet=""True""><DataSeriesCollection><DataSeriesSerializer><SeriesLabel> ↙
    Den" & _
        "drogram</SeriesLabel><DataTypes>Double;Double;Double;Double;Double</DataTypes><D"↙
     & _
        "ataFields>;;;;</DataFields><SymbolStyle Color=""Cyan"" Shape=""None"" /><X /><Y1 ↙
    /><" & _
        "Y /><LineStyle Color=""DarkMagenta"" Pattern=""Solid"" Thickness=""1"" /><Tag /> ↙
    <Y2 />" & _
        "<Y3 /></DataSeriesSerializer></DataSeriesCollection></DataSerializer><Bubble>Enc"↙
     & _
        "odingMethod=Diameter,MaximumSize=20,MinimumSize=5</Bubble><Pie>OtherOffset=0,Sta"↙
     & _
        "rt=0</Pie><Polar>Degrees=True,PiRatioAnnotations=True,Start=0</Polar><Stacked>Fa"↙
     & _
        "lse</Stacked><Radar>Degrees=True,Filled=False,Start=0</Radar><Visible>True</Visi"↙
     & _
        "ble></ChartGroup><ChartGroup><ShowOutline>True</ShowOutline><HiLoData>FillFallin"↙
     & _
        "g=True,FillTransparent=True,FullWidth=False,ShowClose=True,ShowOpen=True</HiLoDa"↙
     & _
        "ta><ChartType>XYPlot</ChartType><Name>Group2</Name><Bar>ClusterOverlap=0,Cluster"↙
     & _
        "Width=50</Bar><DataSerializer Hole=""3.4028234663852886E+38"" /><Bubble>         ↙
    EncodingMe" & _
        "thod=Diameter,MaximumSize=20,MinimumSize=5</Bubble><Pie>OtherOffset=0,Start=0</P"↙
     & _
        "ie><Polar>Degrees=True,PiRatioAnnotations=True,Start=0</Polar><Stacked>False</St"↙
     & _
        "acked><Radar>Degrees=True,Filled=False,Start=0</Radar><Visible>True</Visible></C"↙
     & _
        "hartGroup></ChartGroupsCollection></Chart2DPropBag>"
        Me.chDendrogram.Size = New System.Drawing.Size(422, 393)
        Me.chDendrogram.TabIndex = 0
        '
        'ContextMenuDendrogram
        '
        Me.ContextMenuDendrogram.MenuItems.AddRange(New System.Windows.Forms.MenuItem()   ↙
    {Me.ctxCopy, Me.ctxSaveAs, Me.MenuItem3, Me.ctxPrint, Me.MenuItem6, Me.ctxExit})
        '
        'ctxCopy
        '
        Me.ctxCopy.Index = 0
        Me.ctxCopy.Text = "&Copy"
        '
        'ctxSaveAs
        '
        Me.ctxSaveAs.Index = 1
        Me.ctxSaveAs.Text = "Save &As"
        '
        'MenuItem3
        '
        Me.MenuItem3.Index = 2
        Me.MenuItem3.Text = "-"
        '
        'ctxPrint
        '
        Me.ctxPrint.Index = 3
        Me.ctxPrint.Text = "&Print"
        '
        'MenuItem6
        '
        Me.MenuItem6.Index = 4
        Me.MenuItem6.Text = "-"
        '
        'ctxExit
        '
        Me.ctxExit.Index = 5
        Me.ctxExit.Text = "E&xit"
        '
        'chartDendrogram
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(422, 393)
        Me.ContextMenu = Me.ContextMenuDendrogram
        Me.Controls.Add(Me.chDendrogram)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.Name = "chartDendrogram"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterParent
        Me.Text = "chartDendrogram"
        CType(Me.chDendrogram, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private mySamples As Integer
    Private myVariables As Integer
    Private myInput_data As Array
    Private mySampleNames As Array
    Private myAxisLabels As Array

    Public Property Variables() As Integer
        Get
            Return myVariables
        End Get
        Set(ByVal Value As Integer)
            myVariables = Value
        End Set
    End Property

    Public Property Samples() As Integer
        Get
            Return mySamples
        End Get
        Set(ByVal Value As Integer)
            mySamples = Value
        End Set
    End Property

    Public Property Input_data() As Array
        Get
            Return myInput_data
        End Get
        Set(ByVal Value As Array)
```

```
            myInput_data = Value
        End Set
    End Property

    Public Property SampleNames() As Array
        Get
            Return mySampleNames
        End Get
        Set(ByVal Value As Array)
            mySampleNames = Value
        End Set
    End Property

    Public Property AxisLabels() As Array
        Get
            Return myAxisLabels
        End Get
        Set(ByVal Value As Array)
            myAxisLabels = Value
        End Set
    End Property



    Private Sub mnuFileClose_Click(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs)
        Me.Close()
    End Sub

    Private Sub C1Chart1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles chDendrogram.Load

        'List sample numbers
        Dim SampleNumbers As Integer = Me.SampleNames.GetUpperBound(0)
        Dim Counter As Integer
        Dim newArray As Array
        'For Counter = 0 To SampleNumbers - 1
        'Next


        Dim chartData As C1.Win.C1Chart.ChartDataSeries
        Dim chartDataXY As C1.Win.C1Chart.ChartData
        Dim chartLabels As C1.Win.C1Chart.ChartLabels
        Dim chartLabel As Label
        Dim AxisCounter As Integer
        Dim xAxisData(Samples - 1) As Double
        Dim yAxisData(Samples - 1) As Double
        chDendrogram.Style.Border.BorderStyle = C1.Win.C1Chart.BorderStyleEnum.Solid
        chDendrogram.Style.Border.Thickness = 1
        chDendrogram.ChartArea.AxisX.Text = ControlChars.Lf + "Sample"
        chDendrogram.ChartArea.AxisY.Text = "Distance of Relatedness" + ControlChars.Lf + ↙
    "  "
        chDendrogram.Header.Style.Font = New Font("Arial", 10, FontStyle.Bold)
        chDendrogram.ChartArea.AxisX.TickMinor = TickMarksEnum.None

        'Create new Array with SampleData

        Dim tempAxisLabels(AxisLabels.GetUpperBound(1) - 1) As Integer
        Dim finalAxisLabels(AxisLabels.GetUpperBound(1) - 1) As String
        For Counter = 0 To AxisLabels.GetUpperBound(1) - 1
            tempAxisLabels(Counter) = CType(AxisLabels.GetValue(1, Counter + 1), Integer)
        Next
        Dim tempIndex As Integer
        For Counter = 0 To AxisLabels.GetUpperBound(1) - 1
            tempIndex = CType(tempAxisLabels.GetValue(Counter), Integer)
            finalAxisLabels(Counter) = CType(SampleNames.GetValue(tempIndex - 1), String)
        Next
        'Add labels
        With chDendrogram.ChartArea.AxisX
            .AnnoMethod = C1.Win.C1Chart.AnnotationMethodEnum.ValueLabels
            .ValueLabels.Clear()
            .ValueLabels.AddNewLabel()
            .AnnotationRotation = -30
            For Counter = 0 To AxisLabels.GetUpperBound(1) - 1
                .ValueLabels.AddNewLabel()
                .ValueLabels(Counter).Text = finalAxisLabels(Counter)
                .ValueLabels(Counter).NumericValue = Counter + 1
            Next
        End With

        'Make an Array of only the vertical distances
        Dim interDistance(Input_data.GetUpperBound(0)) As Single
        For Counter = 0 To CType(Input_data.GetUpperBound(0), Integer)
            interDistance(Counter) = CType(Input_data.GetValue(Counter, 2), Single)
        Next

        'Create chart area
        Dim area As Area = chDendrogram.ChartArea
        area.Style.Border.BorderStyle = C1.Win.C1Chart.BorderStyleEnum.None
        area.Style.BackColor = Color.Transparent
        area.Visible = True

        'Create chart group
        Dim group As ChartGroup = chDendrogram.ChartGroups(0)
        group.ChartType = Chart2DTypeEnum.XYPlot

        'Create data and data series
        Dim data As ChartData = group.ChartData
        Dim s As New ChartDataSeries
        data.SeriesList.Add(s)
        Dim ps() As PointF

        'Copy in a zero point
        s = New ChartDataSeries
        data.SeriesList.Add(s)
        ps = New PointF() {New PointF(0.0F, 0.0F), New PointF(0.0F, 0.0F)}
        s.PointData.CopyDataIn(ps)
        s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        s.LineStyle.Color = Color.Black

        'Place the same two lines on first two Samples
        s = New ChartDataSeries
        data.SeriesList.Add(s)
        ps = New PointF() {New PointF(1.0F, 0.0F), New PointF(1.0F, interDistance(0))}
        s.PointData.CopyDataIn(ps)
        s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        s.LineStyle.Color = Color.Black
        s.LineStyle.Thickness = 2

        s = New ChartDataSeries
        data.SeriesList.Add(s)
        ps = New PointF() {New PointF(2.0F, 0.0F), New PointF(2.0F, interDistance(0))}
        s.PointData.CopyDataIn(ps)
        s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        s.LineStyle.Color = Color.Black
        s.LineStyle.Thickness = 2

        'Connect these two vertical lines with a "y-only" line
        s = New ChartDataSeries
        data.SeriesList.Add(s)
        ps = New PointF() {New PointF(1.0F, interDistance(0)), New PointF(2.0F,          ↙
    interDistance(0))}
        s.PointData.CopyDataIn(ps)
        s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        s.LineStyle.Color = Color.Black
        s.LineStyle.Thickness = 2

        'Populate the rest of the grid with lines and crosses
        For Counter = 3 To SampleNames.GetUpperBound(0) + 1
            s = New ChartDataSeries
            data.SeriesList.Add(s)
            ps = New PointF() {New PointF(Counter, 0.0F), New PointF(Counter,         ↙
    interDistance(Counter - 2))}
            s.PointData.CopyDataIn(ps)
            s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
            s.LineStyle.Color = Color.Black
            s.LineStyle.Thickness = 2

            s = New ChartDataSeries
            data.SeriesList.Add(s)
            ps = New PointF() {New PointF(Counter - 1.5F, interDistance(Counter - 2)), New↙
     PointF(Counter, interDistance(Counter - 2))}
            s.PointData.CopyDataIn(ps)
            s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
            s.LineStyle.Color = Color.Black
            s.LineStyle.Thickness = 2

            s = New ChartDataSeries
            data.SeriesList.Add(s)
            ps = New PointF() {New PointF(Counter - 1.5F, interDistance(Counter - 2)), New↙
     PointF(Counter - 1.5F, interDistance(Counter - 3))}
            s.PointData.CopyDataIn(ps)
            s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
            s.LineStyle.Color = Color.Black
            s.LineStyle.Thickness = 2

        Next

        'Copy in a zero point at the end
        s = New ChartDataSeries
        data.SeriesList.Add(s)
        ps = New PointF() {New PointF(SampleNames.GetUpperBound(0) + 2, 0.0F), New PointF ↙
    (SampleNames.GetUpperBound(0) + 2, 0.0F)}
        s.PointData.CopyDataIn(ps)
        s.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        s.LineStyle.Color = Color.Black

    End Sub

    Private Sub ctxCopy_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxCopy.Click
        Dim myDendrogram As chartDendrogram = Me
        myDendrogram.chDendrogram.SaveImage(ImageFormat.Emf)
    End Sub

    Private Sub ctxSaveAs_Click(ByVal sender As System.Object, ByVal e As System.         ↙
    EventArgs) Handles ctxSaveAs.Click
        Dim lastFilterIndex As Integer = 1
        Dim myDendrogram As chartDendrogram = Me
        Dim sfg As New SaveFileDialog

        sfg.Filter = "Metafiles (*.emf)|*.emf|" + "Bmp files (*.bmp)|*.bmp|" + "Gif files ↙
    (*.gif)|*.gif|" + "Jpeg files (*.jpg;*.jpeg)|*.jpg;*.jpeg|" + "Png files (*.png)|*.png↙
    |" + "All graphic files (*.emf;*.bmp;*.gif;*.jpg;*.jpeg;*.png)|*.emf;*.bmp;*.gif;*.jpg↙
    ;*.jpeg;*.png"
        sfg.FilterIndex = lastFilterIndex
        sfg.OverwritePrompt = True
        sfg.CheckPathExists = True
        sfg.RestoreDirectory = False
        sfg.ValidateNames = True
        If sfg.ShowDialog() = DialogResult.OK Then
            Dim fn As String = sfg.FileName
            Dim indext As Integer = fn.LastIndexOf("."c)
            If indext < 0 Then
                indext = fn.Length + 1
                fn += ".emf"
            Else
                indext += 1
            End If
            Dim ext As String = fn.Substring(indext)
            Dim imgfmt As ImageFormat = Nothing

            Select Case ext
                Case "emf"
                    imgfmt = ImageFormat.Emf
                    myDendrogram.chDendrogram.SaveImage(fn, imgfmt)

                Case "bmp"
                    imgfmt = ImageFormat.Bmp

                Case "gif"
                    imgfmt = ImageFormat.Gif

                Case "jpeg", "jpg"
                    imgfmt = ImageFormat.Jpeg

                Case "png"
                    imgfmt = ImageFormat.Png

                Case Else
                    Return
            End Select

            lastFilterIndex = sfg.FilterIndex

            If Not imgfmt.Equals(ImageFormat.Emf) Then
                Dim img As Image = myDendrogram.chDendrogram.GetImage()
                img.Save(fn, imgfmt)
                img.Dispose()
            End If
        End If
        sfg.Dispose()
    End Sub

    Private Sub ctxExit_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxExit.Click
        Me.Close()
    End Sub


    Private Sub chDendrogram_Click(ByVal sender As Object, ByVal e As System.EventArgs)    ↙
    Handles chDendrogram.Click
        Me.Activate()
    End Sub

    Private Sub ctxPrint_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)↙
     Handles ctxPrint.Click
        Dim doc As New C1PrintDocument
        Doc2D_dendrogram(doc, New GenerateEventArgs)
        Dim aprev As New Final_Report
        AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf                 ↙
    Doc2D_dendrogram)
        aprev.C1PrintPreview1.Document = doc
        aprev.ShowDialog()
        RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf              ↙
    Doc2D_dendrogram)
```

```
        aprev.Dispose()
        'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)

    End Sub

    Private Sub Doc2D_dendrogram(ByVal doc As C1PrintDocument, ByVal e As                    ↙
    GenerateEventArgs)
        Dim C1Chart1Raw As chartDendrogram = Me
        Dim C1Chart1 As C1.Win.C1Chart.C1Chart = C1Chart1Raw.chDendrogram
        With doc
            .DefaultUnit = UnitTypeEnum.Mm
            .StartDoc()
            '.RenderBlockText("Chart", 50, 50, Nothing)
            Dim ww As Double = (CType(.BodyAreaSize.Width, Double)) * 0.9
            .RenderBlockC1Printable(C1Chart1, (.BodyAreaSize.Width * 0.9))
            .CanChangePageMetrics()
            .RenderBlockGraphicsBegin()
            .EndDoc()
        End With
    End Sub
End Class
```

```
Imports System.Text.RegularExpressions
Imports C1.Win.C1FlexGrid



Public Class cluster

    Private myLinkages As linkages.pdist_linkage
    Private myClusterLinks As clusters_tjb.clusterlinks
    Private myDendrogram As dendrogram_tjb.dendrogram_tjb_output
    Private myAxisLabel As Object
    Private mySamples As Integer
    Private myVariables As Integer
    Private mySelectedSamples() As Object
    Private myTempData As Object
    Private myRichText As String


    Public ReadOnly Property AxisLabel() As Object
        Get
            Return myAxisLabel
        End Get
    End Property

    Public ReadOnly Property Samples() As Integer
        Get
            Return mySamples
        End Get
    End Property

    Public ReadOnly Property Variables() As Integer
        Get
            Return myVariables
        End Get
    End Property

    Public ReadOnly Property SelectedSamples() As Object
        Get
            Return mySelectedSamples
        End Get
    End Property

    Public ReadOnly Property TempData() As Object
        Get
            Return myTempData
        End Get
    End Property

    Public ReadOnly Property RichText() As String
        Get
            Return myRichText
        End Get
    End Property



    Friend Sub New(ByRef DataTable As Data_Table)

        Dim myLinkages As New linkages.pdist_linkage
        Dim myClusterLinks As New clusters_tjb.clusterlinks
        Dim myDendrogram As New dendrogram_tjb.dendrogram_tjb_output
        Dim SelectSamples As New Select_Samples
        Dim i As Integer
        i = DataTable.DataTable.Rows.Count - 1
        'Define a grid with all of the data in column 1 and 2
        Dim SampleNameList As New C1.Win.C1FlexGrid.CellRange
        SampleNameList = DataTable.DataTable.GetCellRange(1, 1, i, 1)
        Dim newlineString As String = Nothing
        Dim Counter As Integer
        Dim sampleNameClip As String = SampleNameList.Clip

        'Make the clip devoid of whitespace cells
        For Counter = 1 To i
            If CType(DataTable.DataTable(Counter, 2), String) = "1" Then
                newlineString = newlineString & CType(DataTable.DataTable(Counter, 1),     ↙
    String) & Environment.NewLine
            End If
        Next

        'Open up the Sample Selection Dialog
        SelectSamples.samples = newlineString

        Try
            SelectSamples.Text = "Choose Samples for Cluster Analysis"
            SelectSamples.ShowDialog()

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error creating dialog", MessageBoxButtons.OK,     ↙
    MessageBoxIcon.Exclamation)
        End Try

        If SelectSamples.DialogResult = DialogResult.Cancel Then
            Return
        End If

        'Determine which samples where selected and save the names in a String Clip
        Dim SelectedSamples As String
        SelectedSamples = SelectSamples.SampleChoice()
        Dim q As Integer = 0
        'Find where the alpha next to \n characters are
        Dim re As New Regex("[a-zA-Z0-9]\x0D")
        Dim mc As MatchCollection = re.Matches(SelectedSamples)
        'Find out how many alpha or numbers next to \n characters there are
        q = mc.Count

        'Make an array of sample names displayed to user
        Dim SelectedSampleArray(q, 1) As String
        Dim SampleCounter As Integer
        For SampleCounter = 0 To q
            SelectedSampleArray(SampleCounter, 0) = CType(SelectSamples.SelectSamples      ↙
    (SampleCounter + 1, 1), String)
            SelectedSampleArray(SampleCounter, 1) = CType(SelectSamples.SelectSamples      ↙
    (SampleCounter + 1, 2), String)

        Next

        'Make an array of selected samples to be processed
        Dim SelectedSamplesUser(q) As String
        Dim arraynumber As Integer = 0
        For SampleCounter = 0 To q
            If SelectedSampleArray(SampleCounter, 0) = "True" Then
                SelectedSamplesUser(arraynumber) = SelectedSampleArray(SampleCounter, 1)
                arraynumber = arraynumber + 1
            End If
        Next

        'Check to make sure at least 2 samples were chosen
        If arraynumber < 2 Then
            MessageBox.Show("You must select at least two samples", "Sample Selection",    ↙
    MessageBoxButtons.OK, MessageBoxIcon.Exclamation)
            Return
        End If
        'Redimension the selected sample array
        ReDim Preserve SelectedSamplesUser(arraynumber - 1)

        'Find out how many columns have data in them
        Dim NumberofVariables As CellRange
        NumberofVariables = DataTable.DataTable.GetCellRange(1, 3, CType(DataTable.     ↙
    DataTable.Rows.Count, Integer) - 1, CType(DataTable.DataTable.Cols.Count, Integer) -  ↙
    1)
        Dim ColumnData, AdjacentColumnData As CellRange
        Dim l As Integer = 0
        Dim k, m As Integer


        'Count the number of filled in columns (i.e. how many variables).
        Dim rel As New Regex("[0-9]")
        For k = 3 To CType(DataTable.DataTable.Cols.Count, Integer) - 2
            ColumnData = DataTable.DataTable.GetCellRange(1, k, CType(DataTable.DataTable.↙
    Rows.Count, Integer) - 1, k)
            'provide a counter to make sure all columns are contiguous
            AdjacentColumnData = DataTable.DataTable.GetCellRange(1, k + 1, CType         ↙
    (DataTable.DataTable.Rows.Count, Integer) - 1, k + 1)
            If Not rel.Matches(ColumnData.Clip).Count = 0 Then
                l = l + 1
            End If
            'count if columns are not adjacent (i.e. any empty columns in between)
            If Not rel.Matches(ColumnData.Clip).Count = 0 And Not rel.Matches             ↙
    (AdjacentColumnData.Clip).Count = 0 Then
                m = m + 1
            End If
        Next
        'Count last column if it has data in it
        k = k + 1
        If Not rel.Matches(ColumnData.Clip).Count = 0 Then
            l = l + 1
        End If
        'Make user reformat data so the routine will not break
        If Not m = l - 1 Then
            MessageBox.Show("It appears that you have a column with missing data.  Please ↙
    delete or fill in any columns with no data that are inbetween data-bearing columns",  ↙
    "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If

        'Determine the number of replicates
        Dim Replicates As Integer = CType(DataTable.Replicates, Integer)
        If Replicates = Nothing Then
            Dim ReplicateCells As CellRange
            ReplicateCells = DataTable.DataTable.GetCellRange(1, 2, CType(DataTable.      ↙
    DataTable.Rows.Count - 1, Integer), 2)
            Dim maxReplicate As Integer
            maxReplicate = CType(DataTable.DataTable.Aggregate(AggregateEnum.Max,         ↙
    ReplicateCells, AggregateFlags.None), Integer)
            Replicates = maxReplicate


        End If

        'Create an array to "hold" the averages and STDs of each group of data

        Dim x, z As Integer
        Dim AverageRange As CellRange
        Dim n As Integer = SelectedSamplesUser.GetLength(0)
        Dim SamplesToBeProcessed(n - 1) As String
        Dim ClusterToBe(n - 1, l - 1) As Double
        Dim ClusterStdsToBe(n - 1, l - 1) As Double
        For m = 0 To n - 1
            SamplesToBeProcessed(m) = SelectedSamplesUser(m).ToString
            For k = 1 To CType(DataTable.DataTable.Rows.Count, Integer) - 1
                ColumnData = DataTable.DataTable.GetCellRange(k, 1, k, 1)
                If ColumnData.Clip = SelectedSamplesUser(m) Then
                    For z = 3 To 2 + 1
                        AverageRange = DataTable.DataTable.GetCellRange(k, z, k +      ↙
    Replicates - 1, z)
                        ClusterToBe(m, z - 3) = CType(DataTable.DataTable.Aggregate     ↙
    (AggregateEnum.Average, AverageRange, AggregateFlags.None), Double)
                        ClusterStdsToBe(m, z - 3) = CType(DataTable.DataTable.Aggregate ↙
    (AggregateEnum.Std, AverageRange, AggregateFlags.None), Double)
                    Next
                End If
            Next
        Next


        Dim pdist As Object
        Dim linkage_output As Object

        Try
            Call myLinkages.toms_p_dist(1, pdist, ClusterToBe)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem with the 'pdist' routine.  ↙
    Error message: " & ex.Message, "Serious Data Formatting Problem", MessageBoxButtons.OK↙
    , MessageBoxIcon.Stop)
        End Try

        Try
            Call myClusterLinks.toms_linkage(1, linkage_output, pdist)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem with the 'linkage' routine. ↙
     Error message: " & ex.Message, "Serious Data Formatting Problem", MessageBoxButtons. ↙
    OK, MessageBoxIcon.Stop)
            Return
        End Try

        Dim axis_label As Object

        Try
            Call myDendrogram.dendrogram_output(1, axis_label, linkage_output)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem with the 'dendrogram'      ↙
    routine.  Error message: " & ex.Message, "Serious Data Formatting Problem",        ↙
    MessageBoxButtons.OK, MessageBoxIcon.Stop)
            Return
        End Try

        Dim tempLinkage As Array = CType(linkage_output, Array)
        Dim newtempdata(n - 2, 2) As Object
        For m = 0 To n - 2
            For k = 0 To 2
                newtempdata(m, k) = tempLinkage.GetValue(m + 1, k + 1)
            Next
        Next

        'Make a string of axis labels
        Dim axis_labelsText As String = ""
        Dim axisLabelsTemp As Integer
        Dim axis_labels As Array = CType(axis_label, Array)
        For Counter = 0 To SelectedSamplesUser.GetUpperBound(0) - 1
            axisLabelsTemp = CType(axis_labels.GetValue(1, Counter + 1), Integer)
            axis_labelsText = axis_labelsText + CType(SelectedSamplesUser.GetValue      ↙
    (axisLabelsTemp - 1), String) + ControlChars.Lf
        Next
        'Make a string of interdistances
        Dim interDistanceText As String = ""
        Dim interDistanceRound As Single
        Dim interDistanceTemp As Double
        Dim interDistance(newtempdata.GetUpperBound(0)) As Single
        For Counter = 0 To CType(newtempdata.GetUpperBound(0), Integer)
            interDistanceTemp = CType(newtempdata.GetValue(Counter, 2), Double)
            interDistanceRound = CType(Math.Round(interDistanceTemp, 3), Single)
            interDistanceText = interDistanceText + CType(interDistanceRound, String) +   ↙
    ControlChars.Lf
        Next


        Dim richText As String = "The Cluster analysis completed successfully." _
        + ControlChars.Lf + ControlChars.Lf + _
        "In addition to PCA analysis, clustering analysis can be used to determine a   ↙
    relative 'distance' between relations in multivariate data. This would be analogous to↙
     plotting a family tree and using one inch to represent each generation of distance   ↙
    between progenitors and progeny.  The length of vertical lines in clusters is   ↙
    indicative of the 'distance' of relatedness between wells. " _
        + ControlChars.Lf + ControlChars.Lf + _
        "The samples, in order of relatedness are listed below: " _
        + ControlChars.Lf + ControlChars.Lf + _
        axis_labelsText _
        + ControlChars.Lf + ControlChars.Lf + _
        "The first two are most related, with each after more distantly related.  The   ↙
    distance of relation are given in the Dendrogram plot and below:" _
        + ControlChars.Lf + ControlChars.Lf + _
        interDistanceText


        Me.myAxisLabel = axis_label
        Me.mySamples = n
        Me.myVariables = 1
        Me.mySelectedSamples = SelectedSamplesUser
        Me.myTempData = newtempdata
        Me.myRichText = richText

    End Sub

End Class
```

```
Imports C1.Win.C1FlexGrid
Imports System.Text.RegularExpressions

Public Class Data_Table
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents DataTable As C1.Win.C1FlexGrid.C1FlexGrid
    Friend WithEvents ContextMenu1 As System.Windows.Forms.ContextMenu
    Friend WithEvents MenuItem5 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem7 As System.Windows.Forms.MenuItem
    Friend WithEvents mnuContextCut As System.Windows.Forms.MenuItem
    Friend WithEvents mnuContextCopy As System.Windows.Forms.MenuItem
    Friend WithEvents mnuContentPaste As System.Windows.Forms.MenuItem
    Friend WithEvents mnuContextClearContents As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem1 As System.Windows.Forms.MenuItem
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.      ↙
    ResourceManager(GetType(Data_Table))
        Me.DataTable = New C1.Win.C1FlexGrid.C1FlexGrid
        Me.ContextMenu1 = New System.Windows.Forms.ContextMenu
        Me.mnuContextCut = New System.Windows.Forms.MenuItem
        Me.mnuContextCopy = New System.Windows.Forms.MenuItem
        Me.mnuContentPaste = New System.Windows.Forms.MenuItem
        Me.MenuItem5 = New System.Windows.Forms.MenuItem
        Me.mnuContextClearContents = New System.Windows.Forms.MenuItem
        Me.MenuItem7 = New System.Windows.Forms.MenuItem
        Me.MenuItem1 = New System.Windows.Forms.MenuItem
        CType(Me.DataTable, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'DataTable
        '
        Me.DataTable.AccessibleDescription = ""
        Me.DataTable.AccessibleName = "Data_Table"
        Me.DataTable.AllowAddNew = True
        Me.DataTable.AllowDelete = True
        Me.DataTable.AllowDragging = C1.Win.C1FlexGrid.AllowDraggingEnum.None
        Me.DataTable.AllowResizing = C1.Win.C1FlexGrid.AllowResizingEnum.Both
        Me.DataTable.AllowSorting = C1.Win.C1FlexGrid.AllowSortingEnum.None
        Me.DataTable.BackColor = System.Drawing.SystemColors.Window
        Me.DataTable.ColumnInfo = "25,1,0,0,0,85,Columns:0{Width:28;AllowSorting:False;}" ↙
    & Microsoft.VisualBasic.ChrW(9) & "1{Width:130;AllowSorting:Fa" & _
        "lse;TextAlign:LeftCenter;}" & Microsoft.VisualBasic.ChrW(9) & "2{Width:57;      ↙
    AllowSorting:False;TextAlign:CenterCenter;" & _
        "ImageAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "3{Width:70;       ↙
    AllowSorting:False;TextAlign:CenterCenter;}" & _
        "" & Microsoft.VisualBasic.ChrW(9) & "4{Width:70;AllowSorting:False;TextAlign:   ↙
    CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "5{Width:70;AllowSorting:" & _
        "False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "6{Width:70;  ↙
    AllowSorting:False;TextAlign:CenterCen" & _
        "ter;}" & Microsoft.VisualBasic.ChrW(9) & "7{Width:70;AllowSorting:False;TextAlign↙
    :CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "8{Width:70;AllowSor" & _
        "ting:False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "9{Width: ↙
    70;AllowSorting:False;TextAlign:Cent" & _
        "erCenter;}" & Microsoft.VisualBasic.ChrW(9) & "10{Width:70;AllowSorting:False;  ↙
    TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "11{Width:70;A" & _
        "llowSorting:False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "12↙
    {Width:70;AllowSorting:False;TextAl" & _
        "ign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "13{Width:70;AllowSorting: ↙
    False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "14{Wi" & _
        "dth:70;AllowSorting:False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW ↙
    (9) & "15{Width:70;AllowSorting:Fals" & _
        "e;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "16{Width:70;     ↙
    AllowSorting:False;TextAlign:CenterCenter" & _
        ";}" & Microsoft.VisualBasic.ChrW(9) & "17{Width:70;AllowSorting:False;TextAlign: ↙
    CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "18{Width:70;AllowSort" & _
        "ing:False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "19{Width: ↙
    70;AllowSorting:False;TextAlign:Cent" & _
        "erCenter;}" & Microsoft.VisualBasic.ChrW(9) & "20{Width:70;AllowSorting:False;  ↙
    TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "21{Width:70;A" & _
        "llowSorting:False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "22↙
    {Width:70;AllowSorting:False;TextAl" & _
        "ign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "23{Width:70;AllowSorting: ↙
    False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW(9) & "24{Wi" & _
        "dth:70;AllowSorting:False;TextAlign:CenterCenter;}" & Microsoft.VisualBasic.ChrW ↙
    (9)
        Me.DataTable.ContextMenu = Me.ContextMenu1
        Me.DataTable.Dock = System.Windows.Forms.DockStyle.Fill
        Me.DataTable.ExtendLastCol = True
        Me.DataTable.FocusRect = C1.Win.C1FlexGrid.FocusRectEnum.Inset
        Me.DataTable.ForeColor = System.Drawing.SystemColors.WindowText
        Me.DataTable.HighLight = C1.Win.C1FlexGrid.HighLightEnum.WithFocus
        Me.DataTable.ImeMode = System.Windows.Forms.ImeMode.On
        Me.DataTable.KeyActionTab = C1.Win.C1FlexGrid.KeyActionEnum.MoveAcross
        Me.DataTable.Location = New System.Drawing.Point(0, 0)
        Me.DataTable.Name = "DataTable"
        Me.DataTable.Rows.Count = 750
        Me.DataTable.ScrollTips = True
        Me.DataTable.ShowErrors = True
        Me.DataTable.ShowSort = False
        Me.DataTable.Size = New System.Drawing.Size(715, 429)
        Me.DataTable.Styles = New C1.Win.C1FlexGrid.CellStyleCollection("Fixed{BackColor: ↙
    Control;ForeColor:ControlText;Border:Flat,1,ControlDark,Both;}" & Microsoft.        ↙
    VisualBasic.ChrW(9) & "Hi" & _
        "ghlight{BackColor:Highlight;ForeColor:HighlightText;}" & Microsoft.VisualBasic.  ↙
    ChrW(9) & "Search{BackColor:Highlight" & _
        ";ForeColor:HighlightText;}" & Microsoft.VisualBasic.ChrW(9) & "Frozen{BackColor: ↙
    Beige;}" & Microsoft.VisualBasic.ChrW(9) & "EmptyArea{BackColor:AppWorks" & _
        "pace;Border:Flat,1,ControlDarkDark,Both;}" & Microsoft.VisualBasic.ChrW(9) &    ↙
    "GrandTotal{BackColor:Black;ForeColor:W" & _
        "hite;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal0{BackColor:ControlDarkDark;  ↙
    ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal1{BackColor" & _
        ":ControlDarkDark;ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal2 ↙
    {BackColor:ControlDarkDark;ForeColor" & _
        ":White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal3{BackColor:ControlDarkDark;↙
    ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal4{BackCol" & _
```

```
        "or:ControlDarkDark;ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) &          ↙
    "Subtotal5{BackColor:ControlDarkDark;ForeCol" & _
        "or:White;}" & Microsoft.VisualBasic.ChrW(9))
        Me.DataTable.SubtotalPosition = C1.Win.C1FlexGrid.SubtotalPositionEnum.BelowData
        Me.DataTable.TabIndex = 0
        '
        'ContextMenu1
        '
        Me.ContextMenu1.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.        ↙
    mnuContextCut, Me.mnuContextCopy, Me.mnuContentPaste, Me.MenuItem1, Me.MenuItem5, Me. ↙
    mnuContextClearContents, Me.MenuItem7})
        '
        'mnuContextCut
        '
        Me.mnuContextCut.Index = 0
        Me.mnuContextCut.Text = "Cu&t"
        '
        'mnuContextCopy
        '
        Me.mnuContextCopy.Index = 1
        Me.mnuContextCopy.Text = "&Copy"
        '
        'mnuContentPaste
        '
        Me.mnuContentPaste.Index = 2
        Me.mnuContentPaste.Text = "&Paste"
        '
        'MenuItem5
        '
        Me.MenuItem5.Index = 4
        Me.MenuItem5.Text = "&Delete Column(s)"
        '
        'mnuContextClearContents
        '
        Me.mnuContextClearContents.Index = 5
        Me.mnuContextClearContents.Text = "Clear Co&ntents"
        '
        'MenuItem7
        '
        Me.MenuItem7.Index = 6
        Me.MenuItem7.Text = "-"
        '
        'MenuItem1
        '
        Me.MenuItem1.Index = 3
        Me.MenuItem1.Text = "&Insert Column(s)"
        '
        'Data_Table
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(715, 429)
        Me.ContextMenu = Me.ContextMenu1
        Me.Controls.Add(Me.DataTable)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.Name = "Data_Table"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterParent
        Me.Text = "Data Table"
        CType(Me.DataTable, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private mTableName As String
    Public Property TableName() As String
        Get
```

```
            Return mTableName
        End Get
        Set(ByVal Value As String)
            mTableName = Value
        End Set
    End Property

    Private mReplicates As String

    Public Property Replicates() As String
        Get
            Return CType(mReplicates, String)
        End Get
        Set(ByVal Value As String)
            mReplicates = Value
        End Set
    End Property


    Private mColumnHeaders As String
    Public Property ColumnHeaders() As String
        Get
            Return CType(mColumnHeaders, String)
        End Get
        Set(ByVal Value As String)
            mColumnHeaders = Value
        End Set
    End Property

#Region "Data Table initial setup"

    Private Sub Data_Table_Load(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles MyBase.Load

        'Determine the number of active Data Tables
        Dim NumberOfForms As Array
        NumberOfForms = MdiParent.MdiChildren
        'Increment the number of the active form based on ones already open
        Dim i As Integer
        i = NumberOfForms.GetUpperBound(0)
        Me.Text = "Data Table " & i + 1
        TableName = Me.Text

        'Place sample name and replicate in column headers if no variable names are      ↙
    specified
        If Me.ColumnHeaders = "" Then
            Me.ColumnHeaders = "|SampleID|Replicate"
            Dim cols As String = Me.ColumnHeaders
            'Setup the column split character as |
            Dim colNames As String() = cols.Split(CType("|", Char))
            Dim z As Integer
            'Fill from the third column with the names
            For z = 1 To 2
                DataTable(0, z) = colNames(z)
                DataTable.Cols(z).Name = colNames(z)
            Next
        End If

        'If user chooses to name columns with variable names
        If Not Me.ColumnHeaders = "" Then
            'set up columns
            'Find out how many individual variable names exist
            Me.ColumnHeaders = "|SampleID|Replicate|" & Me.ColumnHeaders
            Dim q As Integer = 0
            'Find where the \n characters are
            Dim re As New Regex("\x0D")
            Dim mc As MatchCollection = re.Matches(Me.ColumnHeaders)
            'Find out how many \n characters there are
            q = mc.Count
            'Replace the \n characters with |
            Me.ColumnHeaders = re.Replace(Me.ColumnHeaders, "\x0D", "|")

            ' set up columns
            Dim cols As String = Me.ColumnHeaders
            'Setup the column split character as |
            Dim colNames As String() = cols.Split(CType("|", Char))
            Dim z As Integer
            'Fill from the third column with the names
            For z = 1 To q
                DataTable(0, z) = colNames(z)
                DataTable.Cols(z).Name = colNames(z)
            Next
        End If

        'The following formatting applies to all rows and columns

        'Populate the 0 column rows with row number
        Dim y As Integer
        Dim rowNames As String
        For y = 1 To CType(DataTable.Rows.Count, Integer) - 1
            DataTable.Rows(y).Caption = CType(y, String)
        Next
        'Populate the replicates column with user specified number of replicates.
        Dim countColumn As Integer
        For countColumn = 1 To CType(Me.Replicates, Integer)
            For y = countColumn To CType(DataTable.Rows.Count, Integer) - 1
                DataTable.SetData(y, 2, CType(countColumn, String))
                y = y + (CType(Me.Replicates, Integer) - 1)
            Next
        Next
        'Format each first replicate number to left justify
        Dim cs As CellStyle = DataTable.Styles.Add("First")
        cs.TextAlign = TextAlignEnum.LeftCenter
        Dim CountCell As Integer
        For CountCell = 0 To CType(DataTable.Rows.Count, Integer) - 1
            If Val(DataTable(CountCell, 2)) = 1 Then
                DataTable.SetCellStyle(CountCell, 2, cs)
            End If
        Next

        'Set the replicate number column to be non-editable
        DataTable.Cols(2).AllowEditing = False

        'Set column data type to Double for each data input column
        For countColumn = 3 To CType(DataTable.Cols.Count, Integer) - 1
            DataTable.Cols(countColumn).DataType = GetType(Double)
        Next


        Dim temp As Object = DataTable.GetType.GetProperties()


    End Sub


#End Region

    Private Sub Data_Table_ValidateEdit(ByVal sender As Object, ByVal e As                  ↙
    ValidateEditEventArgs) Handles DataTable.ValidateEdit
        ' validate amounts to make sure they are del 13 C values
        If DataTable.Cols(e.Col).DataType Is GetType(Double) Then
            Try
                Dim dbl As Double = Double.Parse(DataTable.Editor.Text())
                If dbl < -100 Or dbl > 60 Then
```

```
                    MessageBox.Show("Value does not appear to be a PDB stardardized        ↙
    isotope value, please try again", "Error")
                    e.Cancel = True
                End If
            Catch
                e.Cancel = True
            End Try
        End If
    End Sub

#Region "Hot keys (copy, cut, paste, delete) events "

    Private Sub DataTable_KeyDown(ByVal sender As Object, ByVal e As KeyEventArgs) Handles↙
     DataTable.KeyDown
        Dim copy As Boolean, paste As Boolean, cut As Boolean
        ' ** copy: ctrl-C, ctrl-X, ctrl-ins
        If e.Control Then
            If e.KeyCode = Keys.C Or _
            e.KeyCode = Keys.Insert Then
                copy = True
            End If
            If e.KeyCode = Keys.X Then
                cut = True
            End If
        End If
        ' ** paste: ctrl-V, shift-ins
        If (e.Control = True And e.KeyCode = Keys.V) Or _
        (e.Shift And e.KeyCode = Keys.Insert) Then
            paste = True
        End If
        ' ** copy selection to clipboard
        If copy Then
            Clipboard.SetDataObject(DataTable.Clip)
        End If
        ' ** cut selection to the clipboard
        If cut Then
            Clipboard.SetDataObject(DataTable.Clip)
            Dim selected As C1.Win.C1FlexGrid.CellRange
            selected = DataTable.Selection
            selected.Data = Nothing
        End If
        ' ** paste from clipboard
        If paste Then
            ' see of there's text in the clipboard
            Dim data As IDataObject = Clipboard.GetDataObject()
            If data.GetDataPresent(DataFormats.Text) Then
                ' there is, so paste it
                DataTable.Select(DataTable.Row, DataTable.Col, DataTable.Rows.Count - 1,   ↙
    DataTable.Cols.Count - 1, False)
                DataTable.Clip = CType(data.GetData(DataFormats.Text), String)
                DataTable.Select(DataTable.Row, DataTable.Col)
            End If
        End If

        'If the user presses the delete key in a cell or in a range of cells, delete them
        If e.KeyCode = Keys.Delete Then
            Dim selected As C1.Win.C1FlexGrid.CellRange
            selected = DataTable.Selection
            selected.Data = Nothing
        End If
    End Sub

#End Region

    Private Sub mnuContextCut_Click(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles mnuContextCut.Click
        Clipboard.SetDataObject(DataTable.Clip)
        Dim selected As C1.Win.C1FlexGrid.CellRange
        selected = DataTable.Selection
        selected.Data = Nothing
    End Sub

    Private Sub mnuContextCopy_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs) Handles mnuContextCopy.Click
        Clipboard.SetDataObject(DataTable.Clip)
    End Sub

    Private Sub mnuContentPaste_Click(ByVal sender As System.Object, ByVal e As System.    ↙
    EventArgs) Handles mnuContentPaste.Click
        Dim data As IDataObject = Clipboard.GetDataObject()
        If data.GetDataPresent(DataFormats.Text) Then
            ' there is, so paste it
            DataTable.Select(DataTable.Row, DataTable.Col, DataTable.Rows.Count - 1,       ↙
    DataTable.Cols.Count - 1, False)
            DataTable.Clip = CType(data.GetData(DataFormats.Text), String)
            DataTable.Select(DataTable.Row, DataTable.Col)
        End If
    End Sub

    Private Sub mnuContextClearContents_Click(ByVal sender As System.Object, ByVal e As    ↙
    System.EventArgs) Handles mnuContextClearContents.Click
        Dim selected As C1.Win.C1FlexGrid.CellRange
        selected = DataTable.Selection
        selected.Data = Nothing
    End Sub



    Private Sub Data_Table_CellChanged(ByVal sender As Object, ByVal e As RowColEventArgs)↙
     Handles DataTable.CellChanged
        Dim CellRange As CellRange = Me.DataTable.Selection()
        Dim cellStyle As CellStyle = Me.DataTable.Styles.Focus

        cellStyle.Font = New Font(Me.DataTable.Font, FontStyle.Regular)
        CellRange.StyleNew.Font = cellStyle.Font
    End Sub


    Private Sub MenuItem1_Click(ByVal sender As System.Object, ByVal e As System.          ↙
    EventArgs) Handles MenuItem1.Click
        Dim DataTable As Data_Table = Me
        Dim selectedColumns As CellRange
        selectedColumns = DataTable.DataTable.Selection
        Dim selectedColumnLower As Integer = selectedColumns.c1
        Dim selectedColumnUpper As Integer = selectedColumns.c2
        Dim columnRange As ColumnCollection
        columnRange = DataTable.DataTable.Cols
        columnRange.DefaultSize = 70
        Dim columnCount As Integer
            For columnCount = selectedColumnLower To selectedColumnUpper
                columnRange.Insert(columnCount)
            Next

    End Sub

    Private Sub MenuItem5_Click(ByVal sender As System.Object, ByVal e As System.          ↙
    EventArgs) Handles MenuItem5.Click
        Dim DataTable As Data_Table = Me
        Dim selectedColumns As CellRange
        selectedColumns = DataTable.DataTable.Selection
        Dim selectedColumnLower As Integer = selectedColumns.c1
        Dim selectedColumnUpper As Integer = selectedColumns.c2
        Dim columnRange As ColumnCollection
        columnRange = DataTable.DataTable.Cols
        columnRange.DefaultSize = 70
        Dim columnCount As Integer
        For columnCount = selectedColumnLower To selectedColumnUpper
            columnRange.Remove(columnCount)
        Next

    End Sub


    Private Sub DataTable_EnterCell(ByVal sender As Object, ByVal e As System.EventArgs)  ↙
    Handles DataTable.EnterCell
        Dim CellRange As CellRange = Me.DataTable.Selection()
        Dim cellStyle As CellStyle = Me.DataTable.Styles.Focus

        cellStyle.Font = New Font(Me.DataTable.Font, FontStyle.Regular)
        CellRange.StyleNew.Font = cellStyle.Font
    End Sub
End Class
```

```
Public Class Final_Report
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents C1PrintPreview1 As C1.Win.C1PrintPreview.C1PrintPreview
    Friend WithEvents PreviewToolBarButton1 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton2 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton3 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton4 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton5 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton6 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton7 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton8 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton9 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton10 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton11 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton12 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton13 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton14 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton15 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton16 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton17 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton18 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton19 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton20 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton21 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton22 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton23 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton24 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton25 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton26 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton27 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton28 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton29 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton30 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton31 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton32 As C1.Win.C1PrintPreview.PreviewToolBarButton
    Friend WithEvents PreviewToolBarButton33 As C1.Win.C1PrintPreview.PreviewToolBarButton
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.         ↙
```

```
ResourceManager(GetType(Final_Report))
        Me.C1PrintPreview1 = New C1.Win.C1PrintPreview.C1PrintPreview
        Me.PreviewToolBarButton1 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton2 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton3 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton4 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton5 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton6 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton7 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton8 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton9 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton10 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton11 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton12 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton13 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton14 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton15 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton16 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton17 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton18 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton19 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton20 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton21 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton22 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton23 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton24 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton25 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton26 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton27 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton28 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton29 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton30 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton31 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton32 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        Me.PreviewToolBarButton33 = New C1.Win.C1PrintPreview.PreviewToolBarButton
        CType(Me.C1PrintPreview1, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'C1PrintPreview1
        '
        Me.C1PrintPreview1.C1DPageSettings = "color:False;landscape:False;margins:100,100,↙
100,100;papersize:850,1100,TAB1AHQAdA" & _
        "B1AHIA"
        Me.C1PrintPreview1.Dock = System.Windows.Forms.DockStyle.Fill
        Me.C1PrintPreview1.Location = New System.Drawing.Point(0, 0)
        Me.C1PrintPreview1.Name = "C1PrintPreview1"
        Me.C1PrintPreview1.NavigationBar.Cursor = System.Windows.Forms.Cursors.Default
        Me.C1PrintPreview1.NavigationBar.Font = New System.Drawing.Font("Microsoft Sans    ↙
Serif", 8.25!, System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point,     ↙
CType(0, Byte))
        Me.C1PrintPreview1.NavigationBar.OutlineView.Cursor = System.Windows.Forms.Cursors↙
.Default
        Me.C1PrintPreview1.NavigationBar.OutlineView.Font = New System.Drawing.Font(      ↙
"Microsoft Sans Serif", 8.25!, System.Drawing.FontStyle.Regular, System.Drawing.        ↙
GraphicsUnit.Point, CType(0, Byte))
        Me.C1PrintPreview1.NavigationBar.OutlineView.Indent = 19
        Me.C1PrintPreview1.NavigationBar.OutlineView.ItemHeight = 16
        Me.C1PrintPreview1.NavigationBar.OutlineView.TabIndex = 0
        Me.C1PrintPreview1.NavigationBar.OutlineView.Visible = False
        Me.C1PrintPreview1.NavigationBar.Padding = New System.Drawing.Point(6, 3)
        Me.C1PrintPreview1.NavigationBar.TabIndex = 2
        Me.C1PrintPreview1.NavigationBar.ThumbnailsView.AutoArrange = True
        Me.C1PrintPreview1.NavigationBar.ThumbnailsView.Cursor = System.Windows.Forms.    ↙
Cursors.Default
        Me.C1PrintPreview1.NavigationBar.ThumbnailsView.Font = New System.Drawing.Font(   ↙
"Microsoft Sans Serif", 8.25!, System.Drawing.FontStyle.Regular, System.Drawing.        ↙
GraphicsUnit.Point, CType(0, Byte))
```

```
        Me.C1PrintPreview1.NavigationBar.ThumbnailsView.TabIndex = 0
        Me.C1PrintPreview1.NavigationBar.ThumbnailsView.Visible = True
        Me.C1PrintPreview1.NavigationBar.Width = 160
        Me.C1PrintPreview1.PreviewPane.ZoomFactor = 0.75!
        Me.C1PrintPreview1.PreviewPane.ZoomMode = C1.Win.C1PrintPreview.ZoomModeEnum.    ↙
    Custom
        Me.C1PrintPreview1.Size = New System.Drawing.Size(752, 733)
        Me.C1PrintPreview1.Splitter.Cursor = System.Windows.Forms.Cursors.VSplit
        Me.C1PrintPreview1.Splitter.Width = 3
        Me.C1PrintPreview1.StatusBar.Cursor = System.Windows.Forms.Cursors.Default
        Me.C1PrintPreview1.StatusBar.Font = New System.Drawing.Font("Microsoft Sans Serif"↙
    , 8.25!, System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, CType(0,↙
     Byte))
        Me.C1PrintPreview1.StatusBar.TabIndex = 4
        Me.C1PrintPreview1.TabIndex = 0
        Me.C1PrintPreview1.ToolBar.Buttons.AddRange(New System.Windows.Forms.ToolBarButton↙
    () {Me.PreviewToolBarButton1, Me.PreviewToolBarButton2, Me.PreviewToolBarButton3, Me.  ↙
    PreviewToolBarButton4, Me.PreviewToolBarButton5, Me.PreviewToolBarButton6, Me.         ↙
    PreviewToolBarButton7, Me.PreviewToolBarButton8, Me.PreviewToolBarButton9, Me.         ↙
    PreviewToolBarButton10, Me.PreviewToolBarButton11, Me.PreviewToolBarButton12, Me.      ↙
    PreviewToolBarButton13, Me.PreviewToolBarButton14, Me.PreviewToolBarButton15, Me.      ↙
    PreviewToolBarButton16, Me.PreviewToolBarButton17, Me.PreviewToolBarButton18, Me.      ↙
    PreviewToolBarButton19, Me.PreviewToolBarButton20, Me.PreviewToolBarButton21, Me.      ↙
    PreviewToolBarButton22, Me.PreviewToolBarButton23, Me.PreviewToolBarButton24, Me.      ↙
    PreviewToolBarButton25, Me.PreviewToolBarButton26, Me.PreviewToolBarButton27, Me.      ↙
    PreviewToolBarButton28, Me.PreviewToolBarButton29, Me.PreviewToolBarButton30, Me.      ↙
    PreviewToolBarButton31, Me.PreviewToolBarButton32, Me.PreviewToolBarButton33})
        Me.C1PrintPreview1.ToolBar.Cursor = System.Windows.Forms.Cursors.Default
        Me.C1PrintPreview1.ToolBar.Font = New System.Drawing.Font("Microsoft Sans Serif", ↙
    8.25!, System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, CType(0,  ↙
    Byte))
        '
        'PreviewToolBarButton1
        '
        Me.PreviewToolBarButton1.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    FileOpen
        Me.PreviewToolBarButton1.ImageIndex = 0
        Me.PreviewToolBarButton1.ToolTipText = "File Open"
        '
        'PreviewToolBarButton2
        '
        Me.PreviewToolBarButton2.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    FileSave
        Me.PreviewToolBarButton2.ImageIndex = 1
        Me.PreviewToolBarButton2.ToolTipText = "File Save"
        '
        'PreviewToolBarButton3
        '
        Me.PreviewToolBarButton3.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    FilePrint
        Me.PreviewToolBarButton3.ImageIndex = 2
        Me.PreviewToolBarButton3.ToolTipText = "Print"
        '
        'PreviewToolBarButton4
        '
        Me.PreviewToolBarButton4.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    PageSetup
        Me.PreviewToolBarButton4.ImageIndex = 3
        Me.PreviewToolBarButton4.ToolTipText = "Page Setup"
        '
        'PreviewToolBarButton5
        '
        Me.PreviewToolBarButton5.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    Reflow
        Me.PreviewToolBarButton5.ImageIndex = 4
        Me.PreviewToolBarButton5.ToolTipText = "Reflow"
        '
        'PreviewToolBarButton6
        '
        Me.PreviewToolBarButton6.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    Stop
        Me.PreviewToolBarButton6.ImageIndex = 5
        Me.PreviewToolBarButton6.ToolTipText = "Stop"
        Me.PreviewToolBarButton6.Visible = False
        '
        'PreviewToolBarButton7
        '
        Me.PreviewToolBarButton7.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    None
        Me.PreviewToolBarButton7.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'PreviewToolBarButton8
        '
        Me.PreviewToolBarButton8.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    ShowNavigationBar
        Me.PreviewToolBarButton8.ImageIndex = 6
        Me.PreviewToolBarButton8.Pushed = True
        Me.PreviewToolBarButton8.Style = System.Windows.Forms.ToolBarButtonStyle.         ↙
    ToggleButton
        Me.PreviewToolBarButton8.ToolTipText = "Show Navigation Bar"
        '
        'PreviewToolBarButton9
        '
        Me.PreviewToolBarButton9.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum.  ↙
    None
        Me.PreviewToolBarButton9.Style = System.Windows.Forms.ToolBarButtonStyle.Separator
        '
        'PreviewToolBarButton10
        '
        Me.PreviewToolBarButton10.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    MouseHand
        Me.PreviewToolBarButton10.ImageIndex = 7
        Me.PreviewToolBarButton10.Pushed = True
        Me.PreviewToolBarButton10.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    ToggleButton
        Me.PreviewToolBarButton10.ToolTipText = "Hand Tool"
        '
        'PreviewToolBarButton11
        '
        Me.PreviewToolBarButton11.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    MouseZoom
        Me.PreviewToolBarButton11.ImageIndex = 8
        Me.PreviewToolBarButton11.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    DropDownButton
        Me.PreviewToolBarButton11.ToolTipText = "Zoom In Tool"
        '
        'PreviewToolBarButton12
        '
        Me.PreviewToolBarButton12.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    MouseZoomOut
        Me.PreviewToolBarButton12.ImageIndex = 25
        Me.PreviewToolBarButton12.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    DropDownButton
        Me.PreviewToolBarButton12.ToolTipText = "Zoom Out Tool"
        Me.PreviewToolBarButton12.Visible = False
        '
        'PreviewToolBarButton13
        '
        Me.PreviewToolBarButton13.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    MouseSelect
        Me.PreviewToolBarButton13.ImageIndex = 9
        Me.PreviewToolBarButton13.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    ToggleButton
        Me.PreviewToolBarButton13.ToolTipText = "Select Text"
        '
        'PreviewToolBarButton14
        '
        Me.PreviewToolBarButton14.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    FindText
        Me.PreviewToolBarButton14.ImageIndex = 10
        Me.PreviewToolBarButton14.ToolTipText = "Find Text"
        '
        'PreviewToolBarButton15
        '
        Me.PreviewToolBarButton15.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    None
        Me.PreviewToolBarButton15.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    Separator
        '
        'PreviewToolBarButton16
        '
        Me.PreviewToolBarButton16.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    GoFirst
        Me.PreviewToolBarButton16.Enabled = False
        Me.PreviewToolBarButton16.ImageIndex = 11
        Me.PreviewToolBarButton16.ToolTipText = "First Page"
        '
        'PreviewToolBarButton17
        '
        Me.PreviewToolBarButton17.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    GoPrev
        Me.PreviewToolBarButton17.Enabled = False
        Me.PreviewToolBarButton17.ImageIndex = 12
        Me.PreviewToolBarButton17.ToolTipText = "Previous Page"
        '
        'PreviewToolBarButton18
        '
        Me.PreviewToolBarButton18.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    GoNext
        Me.PreviewToolBarButton18.ImageIndex = 13
        Me.PreviewToolBarButton18.ToolTipText = "Next Page"
        '
        'PreviewToolBarButton19
        '
        Me.PreviewToolBarButton19.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    GoLast
        Me.PreviewToolBarButton19.ImageIndex = 14
        Me.PreviewToolBarButton19.ToolTipText = "Last Page"
        '
        'PreviewToolBarButton20
        '
        Me.PreviewToolBarButton20.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    None
        Me.PreviewToolBarButton20.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    Separator
        '
        'PreviewToolBarButton21
        '
        Me.PreviewToolBarButton21.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    HistoryPrev
        Me.PreviewToolBarButton21.Enabled = False
        Me.PreviewToolBarButton21.ImageIndex = 15
        Me.PreviewToolBarButton21.ToolTipText = "Previous View"
        Me.PreviewToolBarButton21.Visible = False
        '
        'PreviewToolBarButton22
        '
        Me.PreviewToolBarButton22.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    HistoryNext
        Me.PreviewToolBarButton22.Enabled = False
        Me.PreviewToolBarButton22.ImageIndex = 16
        Me.PreviewToolBarButton22.ToolTipText = "Next View"
        Me.PreviewToolBarButton22.Visible = False
        '
        'PreviewToolBarButton23
        '
        Me.PreviewToolBarButton23.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    None
        Me.PreviewToolBarButton23.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    Separator
        Me.PreviewToolBarButton23.Visible = False
        '
        'PreviewToolBarButton24
        '
        Me.PreviewToolBarButton24.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ZoomOut
        Me.PreviewToolBarButton24.ImageIndex = 17
        Me.PreviewToolBarButton24.ToolTipText = "Zoom Out"
        Me.PreviewToolBarButton24.Visible = False
        '
        'PreviewToolBarButton25
        '
        Me.PreviewToolBarButton25.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ZoomIn
        Me.PreviewToolBarButton25.ImageIndex = 18
        Me.PreviewToolBarButton25.ToolTipText = "Zoom In"
        Me.PreviewToolBarButton25.Visible = False
        '
        'PreviewToolBarButton26
        '
        Me.PreviewToolBarButton26.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    None
        Me.PreviewToolBarButton26.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    Separator
        Me.PreviewToolBarButton26.Visible = False
        '
        'PreviewToolBarButton27
        '
        Me.PreviewToolBarButton27.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ViewActualSize
        Me.PreviewToolBarButton27.ImageIndex = 19
        Me.PreviewToolBarButton27.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    ToggleButton
        Me.PreviewToolBarButton27.ToolTipText = "Actual Size"
        '
        'PreviewToolBarButton28
        '
        Me.PreviewToolBarButton28.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ViewFullPage
        Me.PreviewToolBarButton28.ImageIndex = 20
        Me.PreviewToolBarButton28.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    ToggleButton
        Me.PreviewToolBarButton28.ToolTipText = "Full Page"
        '
        'PreviewToolBarButton29
        '
        Me.PreviewToolBarButton29.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ViewPageWidth
        Me.PreviewToolBarButton29.ImageIndex = 21
        Me.PreviewToolBarButton29.Style = System.Windows.Forms.ToolBarButtonStyle.        ↙
    ToggleButton
        Me.PreviewToolBarButton29.ToolTipText = "Page Width"
        '
        'PreviewToolBarButton30
        '
        Me.PreviewToolBarButton30.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ViewTwoPages
        Me.PreviewToolBarButton30.ImageIndex = 22
        Me.PreviewToolBarButton30.Style = System.Windows.Forms.ToolBarButtonStyle.      ↙
    ToggleButton
        Me.PreviewToolBarButton30.ToolTipText = "Two Pages"
        '
        'PreviewToolBarButton31
        '
        Me.PreviewToolBarButton31.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    ViewFourPages
        Me.PreviewToolBarButton31.ImageIndex = 23
        Me.PreviewToolBarButton31.Style = System.Windows.Forms.ToolBarButtonStyle.      ↙
    DropDownButton
        Me.PreviewToolBarButton31.ToolTipText = "Four Pages"
        '
        'PreviewToolBarButton32
        '
        Me.PreviewToolBarButton32.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    None
        Me.PreviewToolBarButton32.Style = System.Windows.Forms.ToolBarButtonStyle.      ↙
    Separator
        Me.PreviewToolBarButton32.Visible = False
        '
        'PreviewToolBarButton33
        '
        Me.PreviewToolBarButton33.Action = C1.Win.C1PrintPreview.ToolBarButtonActionEnum. ↙
    Help
        Me.PreviewToolBarButton33.ImageIndex = 24
        Me.PreviewToolBarButton33.ToolTipText = "Help"
        Me.PreviewToolBarButton33.Visible = False
        '
        'Final_Report
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(752, 733)
        Me.Controls.Add(Me.C1PrintPreview1)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.Name = "Final_Report"
        Me.Text = "Print Preview"
        CType(Me.C1PrintPreview1, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private Sub C1PrintPreview1_Load(ByVal sender As System.Object, ByVal e As System.  ↙
    EventArgs) Handles C1PrintPreview1.Load

    End Sub
End Class
```

```
Public Class Make_Table
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents tabSetupSpreadsheet As System.Windows.Forms.TabPage
    Friend WithEvents Label2 As System.Windows.Forms.Label
    Friend WithEvents Label1 As System.Windows.Forms.Label
    Friend WithEvents btnVariableNameNo As System.Windows.Forms.Button
    Friend WithEvents btnVariableNameYes As System.Windows.Forms.Button
    Friend WithEvents tabcntrSetupData As System.Windows.Forms.TabControl
    Friend WithEvents Panel1 As System.Windows.Forms.Panel
    Friend WithEvents Label3 As System.Windows.Forms.Label
    Friend WithEvents txtReplicateNumber As System.Windows.Forms.TextBox
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.  ↙
    ResourceManager(GetType(Make_Table))
        Me.tabSetupSpreadsheet = New System.Windows.Forms.TabPage
        Me.Panel1 = New System.Windows.Forms.Panel
        Me.Label3 = New System.Windows.Forms.Label
        Me.txtReplicateNumber = New System.Windows.Forms.TextBox
        Me.Label2 = New System.Windows.Forms.Label
        Me.Label1 = New System.Windows.Forms.Label
        Me.btnVariableNameNo = New System.Windows.Forms.Button
        Me.btnVariableNameYes = New System.Windows.Forms.Button
        Me.tabcntrSetupData = New System.Windows.Forms.TabControl
        Me.tabSetupSpreadsheet.SuspendLayout()
        Me.Panel1.SuspendLayout()
        Me.tabcntrSetupData.SuspendLayout()
        Me.SuspendLayout()
        '
        'tabSetupSpreadsheet
        '
        Me.tabSetupSpreadsheet.Controls.Add(Me.Panel1)
        Me.tabSetupSpreadsheet.Controls.Add(Me.Label2)
        Me.tabSetupSpreadsheet.Controls.Add(Me.Label1)
        Me.tabSetupSpreadsheet.Controls.Add(Me.btnVariableNameNo)
        Me.tabSetupSpreadsheet.Controls.Add(Me.btnVariableNameYes)
        Me.tabSetupSpreadsheet.Location = New System.Drawing.Point(4, 22)
        Me.tabSetupSpreadsheet.Name = "tabSetupSpreadsheet"
        Me.tabSetupSpreadsheet.Size = New System.Drawing.Size(344, 267)
        Me.tabSetupSpreadsheet.TabIndex = 0
        Me.tabSetupSpreadsheet.Text = "Setup Data Table"
        '
        'Panel1
        '
        Me.Panel1.Controls.Add(Me.Label3)
        Me.Panel1.Controls.Add(Me.txtReplicateNumber)
        Me.Panel1.Location = New System.Drawing.Point(24, 8)
        Me.Panel1.Name = "Panel1"
        Me.Panel1.Size = New System.Drawing.Size(296, 56)
        Me.Panel1.TabIndex = 0
        '
        'Label3
        '
        Me.Label3.Location = New System.Drawing.Point(22, 21)
        Me.Label3.Name = "Label3"
        Me.Label3.Size = New System.Drawing.Size(176, 23)
        Me.Label3.TabIndex = 1
        Me.Label3.Text = "Analytical Replicates (Default = 3)"
        '
        'txtReplicateNumber
        '
        Me.txtReplicateNumber.Location = New System.Drawing.Point(206, 19)
        Me.txtReplicateNumber.Name = "txtReplicateNumber"
        Me.txtReplicateNumber.Size = New System.Drawing.Size(32, 20)
        Me.txtReplicateNumber.TabIndex = 0
        Me.txtReplicateNumber.Text = "3"
        Me.txtReplicateNumber.TextAlign = System.Windows.Forms.HorizontalAlignment.Center
        '
        'Label2
        '
        Me.Label2.Font = New System.Drawing.Font("Microsoft Sans Serif", 9.75!, System.    ↙
    Drawing.FontStyle.Italic, System.Drawing.GraphicsUnit.Point, CType(0, Byte))
        Me.Label2.Location = New System.Drawing.Point(48, 122)
        Me.Label2.Name = "Label2"
        Me.Label2.Size = New System.Drawing.Size(248, 88)
        Me.Label2.TabIndex = 3
        Me.Label2.Text = "In other words, would you like each compound to be identified in↙
     the data table (" & _
        "will not change results of the analysis, but may be more discriptive if the data"↙
     & _
        " table is printed)."
        Me.Label2.TextAlign = System.Drawing.ContentAlignment.MiddleCenter
        '
        'Label1
        '
        Me.Label1.Font = New System.Drawing.Font("Times New Roman", 14.25!, System.Drawing↙
    .FontStyle.Regular, System.Drawing.GraphicsUnit.Point, CType(0, Byte))
        Me.Label1.Location = New System.Drawing.Point(48, 72)
        Me.Label1.Name = "Label1"
        Me.Label1.Size = New System.Drawing.Size(248, 48)
        Me.Label1.TabIndex = 2
        Me.Label1.Text = "Would you like to name each of your variables?"
        Me.Label1.TextAlign = System.Drawing.ContentAlignment.MiddleCenter
        '
        'btnVariableNameNo
        '
        Me.btnVariableNameNo.DialogResult = System.Windows.Forms.DialogResult.Cancel
        Me.btnVariableNameNo.Location = New System.Drawing.Point(200, 224)
        Me.btnVariableNameNo.Name = "btnVariableNameNo"
        Me.btnVariableNameNo.TabIndex = 1
        Me.btnVariableNameNo.Text = "&No"
        '
        'btnVariableNameYes
        '
        Me.btnVariableNameYes.DialogResult = System.Windows.Forms.DialogResult.OK
        Me.btnVariableNameYes.Location = New System.Drawing.Point(56, 224)
        Me.btnVariableNameYes.Name = "btnVariableNameYes"
        Me.btnVariableNameYes.TabIndex = 0
        Me.btnVariableNameYes.Text = "&Yes"
        '
        'tabcntrSetupData
        '
        Me.tabcntrSetupData.Controls.Add(Me.tabSetupSpreadsheet)
        Me.tabcntrSetupData.Dock = System.Windows.Forms.DockStyle.Fill
        Me.tabcntrSetupData.ItemSize = New System.Drawing.Size(96, 18)
        Me.tabcntrSetupData.Location = New System.Drawing.Point(0, 0)
        Me.tabcntrSetupData.Name = "tabcntrSetupData"
        Me.tabcntrSetupData.SelectedIndex = 0
        Me.tabcntrSetupData.ShowToolTips = True
        Me.tabcntrSetupData.Size = New System.Drawing.Size(352, 293)
        Me.tabcntrSetupData.SizeMode = System.Windows.Forms.TabSizeMode.Fixed
        Me.tabcntrSetupData.TabIndex = 0
        '
        'Make_Table
        '
        Me.AcceptButton = Me.btnVariableNameYes
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.CancelButton = Me.btnVariableNameNo
        Me.ClientSize = New System.Drawing.Size(352, 293)
        Me.Controls.Add(Me.tabcntrSetupData)
        Me.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedDialog
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.MaximizeBox = False
        Me.MinimizeBox = False
        Me.Name = "Make_Table"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterScreen
        Me.Text = "Make Data Table"
        Me.tabSetupSpreadsheet.ResumeLayout(False)
        Me.Panel1.ResumeLayout(False)
        Me.tabcntrSetupData.ResumeLayout(False)
        Me.ResumeLayout(False)

    End Sub

#End Region


    Private Sub btnVariableNameNo_Click(ByVal sender As System.Object, ByVal e As System. ↙
    EventArgs) Handles btnVariableNameNo.Click

    End Sub
End Class
```

```
Imports System.Text.RegularExpressions
Imports C1.Win.C1FlexGrid


Public Class manova

    Private myManova As manovaexpandtjb.expandtable
    Private myManova_p As manova_probability.manova_p
    Private myManova_stats As manova_stats.manova_stats
    Private myManova_stats_expanded As manova_expand_stats.manova_expand_statistics
    Private myManova_statsFunctions As manova_expand_stats.manova_expand_statistics

    Private Within As Object
    Private Between As Object
    Private Total As Object
    Private dfWithin As Object
    Private dfBetween As Object
    Private dfTotal As Object
    Private Lambda As Object
    Private Chisq As Object
    Private Chisqdf As Object
    Private Eigenval As Object
    Private Eigenvec As Object
    Private Canon As Object
    Private Mdist As Object
    Private Gnames As Object
    Private testsString As String
    Private richText As String

    Public ReadOnly Property outWithin() As Object
        Get
            Return Within
        End Get
    End Property

    Public ReadOnly Property outBetween() As Object
        Get
            Return Between
        End Get
    End Property

    Public ReadOnly Property outTotal() As Object
        Get
            Return Total
        End Get
    End Property

    Public ReadOnly Property outLambda() As Object
        Get
            Return Lambda
        End Get
    End Property

    Public ReadOnly Property outChisq() As Object
        Get
            Return Chisq
        End Get
    End Property

    Public ReadOnly Property outChisqdf() As Object
        Get
            Return Chisqdf
        End Get
    End Property

    Public ReadOnly Property outEigenval() As Object
        Get
```

```
            Return Eigenval
        End Get
    End Property

    Public ReadOnly Property outEigenvec() As Object
        Get
            Return Eigenvec
        End Get
    End Property

    Public ReadOnly Property outCanon() As Object
        Get
            Return Canon
        End Get
    End Property

    Public ReadOnly Property outMdist() As Object
        Get
            Return Mdist
        End Get
    End Property

    Public ReadOnly Property outGnames() As Object
        Get
            Return Gnames
        End Get
    End Property

    Public ReadOnly Property tests_String() As String
        Get
            Return testsString
        End Get
    End Property

    Public ReadOnly Property rich_Text() As String
        Get
            Return richText
        End Get
    End Property


    Friend Sub New(ByRef DataTable As Data_Table)


        myManova_p = New manova_probability.manova_p

        'Find out how many rows there are
        Dim i As Integer
        i = DataTable.DataTable.Rows.Count - 1
        'Define a grid with all of the data in column 1 and 2
        Dim SelectSamples As New Select_Samples
        Dim SampleNameList As New C1.Win.C1FlexGrid.CellRange
        SampleNameList = DataTable.DataTable.GetCellRange(1, 1, i, 1)
        Dim newlineString As String = Nothing
        Dim Counter As Integer
        Dim sampleNameClip As String = SampleNameList.Clip

        'Make the clip devoid of whitespace cells
        For Counter = 1 To i
            If CType(DataTable.DataTable(Counter, 2), String) = "1" Then
                newlineString = newlineString & CType(DataTable.DataTable(Counter, 1),   ↙
    String) & Environment.NewLine
            End If
        Next

        'Open up the Sample Selection Dialog
        SelectSamples.samples = newlineString
        SelectSamples.Text = "Choose Samples for MANOVA"

        Try
            SelectSamples.ShowDialog()

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error creating dialog", MessageBoxButtons.OK,     ↙
    MessageBoxIcon.Exclamation)

        End Try
        If SelectSamples.DialogResult = DialogResult.Cancel Then
            Return
        End If

        'Determine which samples where selected and save the names in a String Clip
        Dim SelectedSamples As String
        SelectedSamples = SelectSamples.SampleChoice()
        Dim q As Integer = 0
        'Find where the alpha next to \n characters are
        Dim re As New Regex("[a-zA-Z0-9]\x0D")
        Dim mc As MatchCollection = re.Matches(SelectedSamples)
        'Find out how many alpha or numbers next to \n characters there are
        q = mc.Count

        'Make an array of sample names displayed to user
        Dim SelectedSampleArray(q, 1) As String
        Dim SampleCounter As Integer
        For SampleCounter = 0 To q
            SelectedSampleArray(SampleCounter, 0) = CType(SelectSamples.SelectSamples     ↙
    (SampleCounter + 1, 1), String)
            SelectedSampleArray(SampleCounter, 1) = CType(SelectSamples.SelectSamples     ↙
    (SampleCounter + 1, 2), String)

        Next

        'Make an array of selected samples to be processed
        Dim SelectedSamplesUser(q) As String
        Dim arraynumber As Integer = 0
        For SampleCounter = 0 To q
            If SelectedSampleArray(SampleCounter, 0) = "True" Then
                SelectedSamplesUser(arraynumber) = SelectedSampleArray(SampleCounter, 1)
                arraynumber = arraynumber + 1
            End If
        Next

        'Check to make sure at least 2 samples were chosen
        If arraynumber < 2 Then
            MessageBox.Show("You must select at least two samples", "Sample Selection",     ↙
    MessageBoxButtons.OK, MessageBoxIcon.Exclamation)
            Return
        End If

        'Redimension the selected sample array
        ReDim Preserve SelectedSamplesUser(arraynumber - 1)

        'Find out how many columns have data in them
        Dim NumberofVariables As CellRange
        NumberofVariables = DataTable.DataTable.GetCellRange(1, 3, CType(DataTable.     ↙
    DataTable.Rows.Count, Integer) - 1, CType(DataTable.DataTable.Cols.Count, Integer) -     ↙
    1)
        Dim ColumnData, AdjacentColumnData As CellRange
        Dim l As Integer = 0
        Dim k, m As Integer


        'Count the number of filled in columns (i.e. how many variables).
        Dim re1 As New Regex("[0-9]")
        For k = 3 To CType(DataTable.DataTable.Cols.Count, Integer) - 2
            ColumnData = DataTable.DataTable.GetCellRange(1, k, CType(DataTable.DataTable.↙
    Rows.Count, Integer) - 1, k)
            'provide a counter to make sure all columns are contiguous
            AdjacentColumnData = DataTable.DataTable.GetCellRange(1, k + 1, CType          ↙
    (DataTable.DataTable.Rows.Count, Integer) - 1, k + 1)
            If Not re1.Matches(ColumnData.Clip).Count = 0 Then
                l = l + 1
            End If
            'count if columns are not adjacent (i.e. any empty columns in between)
            If Not re1.Matches(ColumnData.Clip).Count = 0 And Not re1.Matches              ↙
    (AdjacentColumnData.Clip).Count = 0 Then
                m = m + 1
            End If
        Next
        'Count last column if it has data in it
        k = k + 1
        If Not re1.Matches(ColumnData.Clip).Count = 0 Then
            l = l + 1
        End If
        'Make user reformat data so the routine will not break
        If Not m = l - 1 Then
            MessageBox.Show("It appears that you have a column with missing data.  Please ↙
    delete or fill in any columns with no data that are inbetween data-bearing columns",  ↙
    "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If

        'Determine the number of replicates
        Dim Replicates As Integer = CType(DataTable.Replicates, Integer)
        If Replicates = Nothing Then
            Dim ReplicateCells As CellRange
            ReplicateCells = DataTable.DataTable.GetCellRange(1, 2, CType(DataTable.       ↙
    DataTable.Rows.Count - 1, Integer), 2)
            Dim maxReplicate As Integer
            maxReplicate = CType(DataTable.DataTable.Aggregate(AggregateEnum.Max,          ↙
    ReplicateCells, AggregateFlags.None), Integer)
            Replicates = maxReplicate


        End If

        'Create an array to "hold" the to-be-processed data

        Dim x, z As Integer
        Dim n As Integer = SelectedSamplesUser.GetLength(0)
        Dim SamplesToBeProcessed(n - 1) As String
        Dim ManovaExpandables(n - 1) As Object
        Dim ManovaExpandToBe(Replicates - 1, l - 1) As Double
        For m = 0 To n - 1
            SamplesToBeProcessed(m) = SelectedSamplesUser(m).ToString
            For k = 1 To CType(DataTable.DataTable.Rows.Count, Integer) - 1
                ColumnData = DataTable.DataTable.GetCellRange(k, 1, k, 1)
                If ColumnData.Clip = SelectedSamplesUser(m) Then
                    For x = 0 To Replicates - 1
                        For z = 3 To 2 + l
                            ManovaExpandToBe(x, z - 3) = CType(DataTable.DataTable(k + x, ↙
    z), Double)
                        Next
                    Next
                End If
            Next
            ManovaExpandables(m) = ManovaExpandToBe.Clone
        Next
        Dim myManovaStats As New manova_stats.manova_stats
        Dim myManova As New manovaexpandtjb.expandtable
        Dim SelectedSamplesExpanded(n - 1) As Object
        Dim SelectedSamplesExpandedStats(n - 1) As Object
        For m = 0 To n - 1
            Try
                Call myManova.manova_numbers_expand_no_stats(1, SelectedSamplesExpanded(m)↙
    , ManovaExpandables(m), l - 1)
            Catch exp As Exception
                ' Will catch any error that we're not explicitly trapping.
                MessageBox.Show("Your data table is not setup correctly...  Error message:↙
     " & exp.Message, "Serious Data Formatting Problem", MessageBoxButtons.OK,          ↙
    MessageBoxIcon.Stop)
            End Try
            Try
                Call myManovaStats.manova_numbers_expand_stats(1,                          ↙
    SelectedSamplesExpandedStats(m), ManovaExpandables(m), l - 1)
            Catch ex As Exception
                MessageBox.Show(ex.Message, "Serious Error", MessageBoxButtons.OK)
            End Try
        Next


        'Determine the number of expanded rows

        If SelectedSamplesExpanded.Length < 2 Then
            MessageBox.Show("You must select at least two samples for this test", "Error",↙
     MessageBoxButtons.OK, MessageBoxIcon.Hand)
            Return
        End If
        Dim tempArray As Array = CType(SelectedSamplesExpanded(0), Array)
        Dim ManovaReplicates As Integer = tempArray.GetLength(0) 'Length of expanded
        Dim ManovaArrays As Integer = SelectedSamplesUser.GetLength(0) 'Number of Samples
        Dim SelectedSamplesUserExpanded((ManovaArrays * ManovaReplicates) - 1) As Object

        'Create an array of expanded sample names
        Dim CounterExpanded As Integer
        Dim index As Integer = 0
        For CounterExpanded = 0 To ManovaArrays - 1
            For Counter = index To (index + ManovaReplicates) - 1
                SelectedSamplesUserExpanded(Counter) = SamplesToBeProcessed                ↙
    (CounterExpanded)
            Next
            index += 10
        Next

        'Determine the number of combinations of sample tests
        Dim NumberOfTests As Integer = 0
        For Counter = 0 To ManovaArrays - 1
            NumberOfTests = NumberOfTests + Counter
        Next

        'Make new arrays with all the test combinations
        Dim tempArray2 As Array
        Dim SampleNameTest((ManovaReplicates * 2) - 1) As Object
        Dim SampleDataTest(((ManovaReplicates * 2) - 1), l - 1) As Double
        Dim SampleDataTestArray(NumberOfTests - 1) As Object
        Dim SampleNameTestArray(NumberOfTests - 1) As Object
        CounterExpanded = 0
        Dim TestCounter As Integer = 0
        Dim PyramidCounter As Integer = 1
        Dim TestArrayCounter As Integer = 0
        For TestCounter = 0 To ManovaArrays - 1
            For Counter = PyramidCounter To ManovaArrays - 1
                tempArray = CType(SelectedSamplesExpanded(TestCounter), Array)
                tempArray2 = CType(SelectedSamplesExpanded(Counter), Array)

                'Add tempArray  into new array
                Array.Copy(tempArray, 1, SampleDataTest, 0, tempArray.Length)
                'Add tempArray2 into new array after tempArray
            Array.Copy(tempArray2, 1, SampleDataTest, tempArray.Length, tempArray2.  ↙
    Length)

            'Add sample names to new Array

            For index = 0 To ManovaReplicates - 1
                SampleNameTest(index) = SelectedSamplesUser(TestCounter)
            Next

            For index = ManovaReplicates To SampleNameTest.Length - 1
                SampleNameTest(index) = SelectedSamplesUser(Counter)
            Next


            CounterExpanded += ManovaReplicates * 2


            'Clone these into a the counted Array
            SampleDataTestArray(TestArrayCounter) = SampleDataTest.Clone
            SampleNameTestArray(TestArrayCounter) = SampleNameTest.Clone
            'Now, increment the TestArrayCounter
            TestArrayCounter += 1

        Next
        'Increment the PyramidCounter
        PyramidCounter += 1
    Next

    Dim myManovaExpandedStats As New manova_expand_stats.manova_expand_statistics
    Dim myManovaStatistics As New manova_stats_functions.manova_stats_funct
    Dim ManovaProb(NumberOfTests - 1) As Object
    Dim ManovaStats(NumberOfTests - 1) As Object
    Dim ManovaStatsTemp As Object

    'Dim all of the Manova stats individually
    Dim Within(NumberOfTests - 1) As Object
    Dim WithinTemp As Object
    Dim Between(NumberOfTests - 1) As Object
    Dim BetweenTemp As Object
    Dim Total(NumberOfTests - 1) As Object
    Dim TotalTemp As Object
    Dim dfWithin(NumberOfTests - 1) As Object
    Dim dfWithinTemp As Object
    Dim dfBetween(NumberOfTests - 1) As Object
    Dim dfBetweenTemp As Object
    Dim dfTotal(NumberOfTests - 1) As Object
    Dim dfTotalTemp As Object
    Dim lambda(NumberOfTests - 1) As Object
    Dim lambdaTemp As Object
    Dim chisq(NumberOfTests - 1) As Object
    Dim chisqTemp As Object
    Dim chisqdf(NumberOfTests - 1) As Object
    Dim chisqdfTemp As Object
    Dim eigenval(NumberOfTests - 1) As Object
    Dim eigenvalTemp As Object
    Dim eigenvec(NumberOfTests - 1) As Object
    Dim eigenvecTemp As Object
    Dim canon(NumberOfTests - 1) As Object
    Dim canonTemp As Object
    Dim mdist(NumberOfTests - 1) As Object
    Dim mdistTemp As Object
    Dim gnames(NumberOfTests - 1) As Object
    Dim gnamesTemp As Object

    Dim SampleDataTestTempArray As Object
    Dim SampleNamesTestTempArray As Object
    Dim ManovaProbTemp As Object
```

```
        For index = 0 To NumberOfTests - 1
            SampleDataTestTempArray = SampleDataTestArray(index)
            SampleNamesTestTempArray = SampleNameTestArray(index)

            Try
                Call myManova_p.toms_manova_p(1, ManovaProbTemp, SampleNamesTestTempArray, ↙
 SampleDataTestTempArray)
            Catch exp As Exception
                'Will catch any error that we're not explicitly trapping.
                MessageBox.Show(exp.message, "Error", MessageBoxButtons.OKCancel,        ↙
MessageBoxIcon.Stop)
                Return
            End Try
            ManovaProb(index) = ManovaProbTemp

            Try
                Call myManovaExpandedStats.toms_manova_stats(1, ManovaStatsTemp,         ↙
SampleNamesTestTempArray, SampleDataTestTempArray)
            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
Error)
                Return
            End Try
            ManovaStats(index) = ManovaStatsTemp


            Try
                Call myManovaStatistics.manova_between(1, BetweenTemp,                   ↙
SampleDataTestTempArray, SampleNamesTestTempArray)
            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
Error)
                Return
            End Try
            Between(index) = BetweenTemp

            Try
                Call myManovaStatistics.manova_within(1, WithinTemp,                     ↙
SampleDataTestTempArray, SampleNamesTestTempArray)
            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
Error)
                Return
            End Try
            Within(index) = WithinTemp

            Try
                Call myManovaStatistics.manova_total(1, TotalTemp, SampleDataTestTempArray↙
, SampleNamesTestTempArray)

            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
Error)
                Return
            End Try
            Total(index) = TotalTemp

            Try
                Call myManovaStatistics.manova_dfwithin(1, dfWithinTemp,                 ↙
SampleDataTestTempArray, SampleNamesTestTempArray)

            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
Error)
                Return
            End Try
            dfWithin(index) = dfWithinTemp
        Try
            Call myManovaStatistics.manova_dfbetween(1, dfBetweenTemp,                    ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
            Return
        End Try
        dfBetween(index) = dfBetweenTemp


        Try
            Call myManovaStatistics.manova_dftotal(1, dfTotalTemp,                        ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
            Return
        End Try
        dfTotal(index) = dfTotalTemp

        Try
            Call myManovaStatistics.manova_lambda(1, lambdaTemp,                          ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
            Return
        End Try
        lambda(index) = lambdaTemp

        Try
            Call myManovaStatistics.manova_chisq(1, chisqTemp, SampleDataTestTempArray↙
    , SampleNamesTestTempArray)

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
            Return
        End Try
        chisq(index) = chisqTemp


        Try
            Call myManovaStatistics.manova_chisqdf(1, chisqdfTemp,                        ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
            Return
        End Try
        chisqdf(index) = chisqdfTemp

        Try
            Call myManovaStatistics.manova_eigenval(1, eigenvalTemp,                      ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
            Return
        End Try
```

```
            eigenval(index) = eigenvalTemp

            Try
                Call myManovaStatistics.manova_eigenvec(1, eigenvecTemp,                    ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
                Return
            End Try
            eigenvec(index) = eigenvecTemp

            Try
                Call myManovaStatistics.manova_canon(1, canonTemp, SampleDataTestTempArray↙
    , SampleNamesTestTempArray)

            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
                Return
            End Try
            canon(index) = canonTemp

            Try
                Call myManovaStatistics.manova_mdist(1, mdistTemp, SampleDataTestTempArray↙
    , SampleNamesTestTempArray)

            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
                Return
            End Try
            mdist(index) = mdistTemp

            Try
                Call myManovaStatistics.manova_gnames(1, gnamesTemp,                        ↙
    SampleDataTestTempArray, SampleNamesTestTempArray)

            Catch ex As Exception
                MessageBox.Show(ex.Message, "Error", MessageBoxButtons.OK, MessageBoxIcon.↙
    Error)
                Return
            End Try
            gnames(index) = gnamesTemp

        Next

        'Create a text file with the P values
        Dim testsString As String = ""
        Dim tempProbValue As Double
        Dim tempProbValueRound As Single
        Dim testStringTemp As String = ""
        Dim testsStringArray As Array
        For index = 0 To NumberOfTests - 1
            testsStringArray = CType(gnames.GetValue(index), Array)
            testsString = testsString + CType(testsStringArray.GetValue(1, 1), String) +  ↙
    ControlChars.Tab + ControlChars.Tab
            testsString = testsString + CType(testsStringArray.GetValue(2, 1), String) +  ↙
    ControlChars.Tab + ControlChars.Tab
            tempProbValue = CType(ManovaProb.GetValue(index), Double)
            If tempProbValue < 0.001 Then
                testStringTemp = "< 0.001"
            End If
            If tempProbValue < 0.01 And tempProbValue >= 0.001 Then
                testStringTemp = "< 0.01"
            End If
            If tempProbValue > 0.01 Then
                tempProbValueRound = CType(Math.Round(tempProbValue, 4), Single)
                testStringTemp = CType(tempProbValueRound, String)
            End If
            testsString = testsString + testStringTemp + ControlChars.Lf

        Next

        'Create the output text box
        Dim richText As String = "Multiple analysis of variance completed successfully.  "↙
  _
        + ControlChars.Lf + ControlChars.Lf + _
        "In data sets with multiple variables, it is desireable to determine if the means ↙
    of two samples are significantly different.  A multiple analysis of variance (MANOVA) ↙
    can be used to produce probability values.  A P value of 0.01 essentially means that ↙
    one can be 99% certain that chance alone would not lead to the differences seen ↙
    between sample means.  In this analysis, one must have a 'square' matrix.  Therefore, ↙
    the original data is expanded using a random number generator to produce the proper ↙
    matrix dimensions. " _
        + ControlChars.Lf + ControlChars.Lf + _
        "The following table shows each test (Sample 1 vs Sample 2) and the P value.  A P ↙
    value of less than 0.05 indicates a significant difference." _
        + ControlChars.Lf + ControlChars.Lf + _
        "Sample 1" + ControlChars.Tab + ControlChars.Tab + "Sample 2" + ControlChars.Tab +↙
     ControlChars.Tab + "P value" _
        + ControlChars.Lf + _
        "--------" + ControlChars.Tab + ControlChars.Tab + "--------" + ControlChars.Tab +↙
     ControlChars.Tab + "-------" + ControlChars.Lf + ControlChars.Lf + testsString


        Me.Between = Between
        Me.Within = Within
        Me.Total = Total
        Me.dfWithin = dfWithin
        Me.dfBetween = dfBetween
        Me.dfTotal = dfTotal
        Me.Lambda = lambda
        Me.Chisq = chisq
        Me.Eigenval = eigenval
        Me.Eigenvec = eigenvec
        Me.Canon = canon
        Me.Mdist = mdist
        Me.Gnames = gnames
        Me.testsString = testsString
        Me.richText = richText

    End Sub

End Class
```

```
Imports System.Text.RegularExpressions
Imports C1.Win.C1FlexGrid


Public Class pca

    Private myPCA_Output As PCA_output.PCA_output_data
    Private myNewVariances As Object
    Private mySamples As Integer
    Private myVariables As Integer
    Private mySelectedSamples() As Object
    Private myTempData As Object
    Private myRichText As String


    Public ReadOnly Property NewVariances() As Object
        Get
            Return myNewVariances
        End Get
    End Property

    Public ReadOnly Property Samples() As Integer
        Get
            Return mySamples
        End Get
    End Property

    Public ReadOnly Property Variables() As Integer
        Get
            Return myVariables
        End Get
    End Property

    Public ReadOnly Property SelectedSamples() As Object
        Get
            Return mySelectedSamples
        End Get
    End Property

    Public ReadOnly Property TempData() As Object
        Get
            Return myTempData
        End Get
    End Property

    Public ReadOnly Property RichText() As String
        Get
            Return myRichText
        End Get
    End Property


    Friend Sub New(ByRef DataTable As Data_Table)

        Dim myPCA_Output As New PCA_output.PCA_output_data

        Dim i As Integer
        i = DataTable.DataTable.Rows.Count - 1
        'Define a grid with all of the data in column 1 and 2
        Dim SelectSamples As New Select_Samples
        Dim SampleNameList As New C1.Win.C1FlexGrid.CellRange
        SampleNameList = DataTable.DataTable.GetCellRange(1, 1, i, 1)
        Dim newlineString As String = Nothing
        Dim Counter As Integer
        Dim sampleNameClip As String = SampleNameList.Clip
        'Make the clip devoid of whitespace cells
        For Counter = 1 To i
            If CType(DataTable.DataTable(Counter, 2), String) = "1" Then
                newlineString = newlineString & CType(DataTable.DataTable(Counter, 1),  ↙
    String) & Environment.NewLine
            End If
        Next

        'Open up the Sample Selection Dialog
        SelectSamples.samples = newlineString
        SelectSamples.Text = "Choose Samples for PCA Analysis"
        Try
            SelectSamples.ShowDialog()

        Catch ex As Exception
            MessageBox.Show(ex.Message, "Error creating dialog", MessageBoxButtons.OK,  ↙
    MessageBoxIcon.Exclamation)

        End Try
        If SelectSamples.DialogResult = DialogResult.Cancel Then
            Return
        End If

        'Determine which samples where selected and save the names in a String Clip
        Dim SelectedSamples As String
        SelectedSamples = SelectSamples.SampleChoice()
        Dim q As Integer = 0
        'Find where the alpha next to \n characters are
        Dim re As New Regex("[a-zA-Z0-9]\x0D")
        Dim mc As MatchCollection = re.Matches(SelectedSamples)
        'Find out how many alpha or numbers next to \n characters there are
        q = mc.Count

        'Make an array of sample names displayed to user
        Dim SelectedSampleArray(q, 1) As String
        Dim SampleCounter As Integer
        For SampleCounter = 0 To q
            SelectedSampleArray(SampleCounter, 0) = CType(SelectSamples.SelectSamples   ↙
    (SampleCounter + 1, 1), String)
            SelectedSampleArray(SampleCounter, 1) = CType(SelectSamples.SelectSamples   ↙
    (SampleCounter + 1, 2), String)

        Next

        'Make an array of selected samples to be processed
        Dim SelectedSamplesUser(q) As String
        Dim arraynumber As Integer = 0
        For SampleCounter = 0 To q
            If SelectedSampleArray(SampleCounter, 0) = "True" Then
                SelectedSamplesUser(arraynumber) = SelectedSampleArray(SampleCounter, 1)
                arraynumber = arraynumber + 1
            End If
        Next

        'Check to make sure at least 2 samples were chosen
        If arraynumber < 2 Then
            MessageBox.Show("You must select at least two samples", "Sample Selection",  ↙
    MessageBoxButtons.OK, MessageBoxIcon.Exclamation)
            Return
        End If

        'Redimension the selected sample array
        ReDim Preserve SelectedSamplesUser(arraynumber - 1)


        'Find out how many columns have data in them
        Dim NumberofVariables As CellRange
        NumberofVariables = DataTable.DataTable.GetCellRange(1, 3, CType(DataTable.       ↙
    DataTable.Rows.Count, Integer) - 1, CType(DataTable.DataTable.Cols.Count, Integer) -  ↙
    1)
        Dim ColumnData, AdjacentColumnData As CellRange
        Dim l As Integer = 0
        Dim k, m As Integer


        'Count the number of filled in columns (i.e. how many variables).
        Dim re1 As New Regex("[0-9]")
        For k = 3 To CType(DataTable.DataTable.Cols.Count, Integer) - 2
            ColumnData = DataTable.DataTable.GetCellRange(1, k, CType(DataTable.DataTable.↙
    Rows.Count, Integer) - 1, k)
            'provide a counter to make sure all columns are contiguous
            AdjacentColumnData = DataTable.DataTable.GetCellRange(1, k + 1, CType           ↙
    (DataTable.DataTable.Rows.Count, Integer) - 1, k + 1)
            If Not re1.Matches(ColumnData.Clip).Count = 0 Then
                l = l + 1
            End If
            'count if columns are not adjacent (i.e. any empty columns in between)
            If Not re1.Matches(ColumnData.Clip).Count = 0 And Not re1.Matches             ↙
    (AdjacentColumnData.Clip).Count = 0 Then
                m = m + 1
            End If
        Next
        'Count last column if it has data in it
        k = k + 1
        If Not re1.Matches(ColumnData.Clip).Count = 0 Then
            l = l + 1
        End If
        'Make user reformat data so the routine will not break
        If Not m = l - 1 Then
            MessageBox.Show("It appears that you have a column with missing data.  Please ↙
    delete or fill in any columns with no data that are inbetween data-bearing columns",  ↙
    "Error", MessageBoxButtons.OK, MessageBoxIcon.Error)
            Return
        End If

        'Determine the number of replicates
        Dim Replicates As Integer = CType(DataTable.Replicates, Integer)
        If Replicates = Nothing Then
            Dim ReplicateCells As CellRange
            ReplicateCells = DataTable.DataTable.GetCellRange(1, 2, CType(DataTable.        ↙
    DataTable.Rows.Count - 1, Integer), 2)
            Dim maxReplicate As Integer
            maxReplicate = CType(DataTable.DataTable.Aggregate(AggregateEnum.Max,          ↙
    ReplicateCells, AggregateFlags.None), Integer)
            Replicates = maxReplicate
        End If


        'Create an array to "hold" the averages and STDs of each group of data

        Dim x, z As Integer
        Dim AverageRange As CellRange
        Dim n As Integer = SelectedSamplesUser.GetLength(0)
        Dim SamplesToBeProcessed(n - 1) As String
        Dim PCAToBe(n - 1, l - 1) As Double
        Dim PCAStdsToBe(n - 1, l - 1) As Double
        For m = 0 To n - 1
            SamplesToBeProcessed(m) = SelectedSamplesUser(m).ToString
            For k = 1 To CType(DataTable.DataTable.Rows.Count, Integer) - 1
                ColumnData = DataTable.DataTable.GetCellRange(k, 1, k, 1)
                If ColumnData.Clip = SelectedSamplesUser(m) Then
                    For z = 3 To 2 + l
                        AverageRange = DataTable.DataTable.GetCellRange(k, z, k +          ↙
    Replicates - 1, z)
```

```
                        PCAToBe(m, z - 3) = CType(DataTable.DataTable.Aggregate       ↙
(AggregateEnum.Average, AverageRange, AggregateFlags.None), Double)
                        PCAStdsToBe(m, z - 3) = CType(DataTable.DataTable.Aggregate   ↙
(AggregateEnum.Std, AverageRange, AggregateFlags.None), Double)
                    Next
                End If
            Next
        Next


        Dim newdata As Object
        Dim pcs As Object
        Dim variances As Object
        Dim t2 As Object
        Try
            Call myPCA_Output.toms_pca_newdata(1, newdata, PCAToBe)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem with the 'newdata' routine. ↙
 Error message: " & ex.message, "Serious Data Problem", MessageBoxButtons.OK,          ↙
MessageBoxIcon.Stop)
            Return
        End Try

        Try
            Call myPCA_Output.toms_pca_pcs(1, pcs, PCAToBe)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem with the 'pcs' routine.     ↙
Error message: " & ex.message, "Serious Data Problem", MessageBoxButtons.OK,           ↙
MessageBoxIcon.Stop)
            Return
        End Try

        Try
            Call myPCA_Output.toms_pca_variances(1, variances, PCAToBe)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem 'variances' routine.  Error ↙
message: " & ex.Message, "Serious Data Problem", MessageBoxButtons.OK, MessageBoxIcon.↙
Stop)
            Return
        End Try

        Try
            Call myPCA_Output.toms_pca_t2(1, t2, PCAToBe)
        Catch ex As Exception
            'Will catch any error that we're not explicitly trapping.
            MessageBox.Show("Your Data Table has some problem 't2' routine", "Serious Data↙
 Problem", MessageBoxButtons.OK, MessageBoxIcon.Stop)
            Return
        End Try

        Dim tempnewdata As Array = CType(newdata, Array)
        Dim newtempdata(n - 1, l - 1) As Object
        For m = 0 To n - 1
            For k = 0 To l - 1
                newtempdata(m, k) = tempnewdata.GetValue(m + 1, k + 1)
            Next
        Next

        Dim tempnewvariances As Array = CType(variances, Array)
        Dim newtempvariances(l - 1) As Object
        For k = 0 To l - 1
            newtempvariances(k) = tempnewvariances.GetValue(k + 1, 1)
        Next
        'Create a string of the pcs
        Dim temppcs As Array = CType(pcs, Array)
        Dim temppcsSingle As Single
        Dim temppcsSingleRound As Single
        Dim temppcstext As String
        For m = 1 To temppcs.GetUpperBound(1)
            For k = 1 To l
                temppcsSingle = CType(temppcs.GetValue(m, k), Single)
                temppcsSingleRound = CType(Math.Round(temppcsSingle, 4), Single)
                temppcstext = temppcstext & CType(temppcsSingleRound, String) +          ↙
    ControlChars.Tab
            Next
            temppcstext = temppcstext + ControlChars.Lf
        Next


        'Create string of variances
        Dim tempvariancesText As String
        Dim tempVariance As Double
        Dim tempVariancesSingle As Single = 0
        Dim tempVariancesSingleRound As Single
        For k = 0 To l - 1
            tempVariancesSingle = tempVariancesSingle + CType(newtempvariances(k), Single)
        Next

        For k = 0 To l - 1
            tempVariance = (100 * CType(newtempvariances(k), Single)) /                  ↙
    tempVariancesSingle
            tempVariancesSingleRound = CType(Math.Round(tempVariance, 4), Single)
            tempvariancesText = tempvariancesText & CType(tempVariancesSingleRound,      ↙
    String) + ControlChars.Tab
        Next


        'Create a string of the newdata
        Dim tempnewdataSingle As Single
        Dim tempnewdataSingleRound As Single
        Dim tempnewdatatext As String
        For m = 1 To n - 1
            For k = 1 To l
                tempnewdataSingle = CType(tempnewdata.GetValue(m, k), Single)
                tempnewdataSingleRound = CType(Math.Round(tempnewdataSingle, 5), Single)
                tempnewdatatext = tempnewdatatext & CType(tempnewdataSingleRound, String) ↙
    + ControlChars.Tab
            Next
            tempnewdatatext = tempnewdatatext + ControlChars.Lf
        Next


        Dim richText As String = "PCA analysis completed successfully.  " _
        + ControlChars.Lf + ControlChars.Lf + _
        "In data sets with multiple variables, groups of variables often behave similarly.↙
     More than one variable may in fact be describing the same principle of the system.   ↙
    PCA attempts to simplify a multivariate data set by replacing a group of variables    ↙
    with a single new variable, called a principal component. Each principal component is ↙
    a linear combination of the original variables. The variance of each principal        ↙
    component is the maximum among all possible choices. The analysis provides information↙
     as to how much of the original variance is represented by each principal component.  ↙
    Therefore, when the primary components are graphed against one-another, data sets that↙
     are highly similar will plot together, while dissimilar data sets will occupy        ↙
    different spaces on a graph." _
        + ControlChars.Lf + ControlChars.Lf + _
        "The result of placing the scores in a new coordinate system allows visualizing   ↙
    the data.  The loadings in the new coordinate system are shown here:" _
        + ControlChars.Lf + ControlChars.Lf + tempnewdatatext + ControlChars.Lf +         ↙
    ControlChars.Lf + _
        "Variance data are also produced during a PCA.  Each variance output corresponds  ↙
    to the principal components loadings shown above (by column).  The variances (as %)   ↙
    are shown in the bar chart (with cumulative totals shown in the bar labels) and below:↙
    " _
        + ControlChars.Lf + ControlChars.Lf + tempvariancesText + ControlChars.Lf +       ↙
    ControlChars.Lf + _
        "The whole purpose of PCA is to reduce the majority of the variability to just a  ↙
    few new variables.  For this reason, the first and second new variables are plotted   ↙
    against one another.  Most of the variability is depicted in 'Component One' (shown   ↙
    graphically on the X-Axis of the scatter plot).  Variability in 'Component Two' (Y-   ↙
    Axis of scatter plot) provides a second dimension with the second-most variability.   ↙
    Therefore where samples cluster, they are more closely related."

        Me.myNewVariances = newtempvariances
        Me.mySamples = n
        Me.myVariables = l
        Me.mySelectedSamples = SelectedSamplesUser
        Me.myTempData = newtempdata
        Me.myRichText = richText


    End Sub

End Class
```

```
Imports C1.Win.C1Chart
Imports System.Drawing.Imaging
Imports System.Drawing.Printing
Imports C1.C1PrintDocument


Public Class Plot
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents chartPCA As C1.Win.C1Chart.C1Chart
    Friend WithEvents ctxCopy As System.Windows.Forms.MenuItem
    Friend WithEvents ctxSaveAs As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem3 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxPrint As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem6 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxExit As System.Windows.Forms.MenuItem
    Friend WithEvents ContextMenuPlot As System.Windows.Forms.ContextMenu
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.  ↙
    ResourceManager(GetType(Plot))
        Me.chartPCA = New C1.Win.C1Chart.C1Chart
        Me.ContextMenuPlot = New System.Windows.Forms.ContextMenu
        Me.ctxCopy = New System.Windows.Forms.MenuItem
        Me.ctxSaveAs = New System.Windows.Forms.MenuItem
        Me.MenuItem3 = New System.Windows.Forms.MenuItem
        Me.ctxPrint = New System.Windows.Forms.MenuItem
        Me.MenuItem6 = New System.Windows.Forms.MenuItem
        Me.ctxExit = New System.Windows.Forms.MenuItem
        CType(Me.chartPCA, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'chartPCA
        '
        Me.chartPCA.BackColor = System.Drawing.Color.White
        Me.chartPCA.DataSource = Nothing
        Me.chartPCA.Dock = System.Windows.Forms.DockStyle.Fill
        Me.chartPCA.Location = New System.Drawing.Point(0, 0)
        Me.chartPCA.Name = "chartPCA"
        Me.chartPCA.PropBag = "<?xml version=""1.0""?><Chart2DPropBag Version="""">  ↙
    <StyleCollection><NamedStyle><Par" & _
        "entName>Area</ParentName><StyleData>Border=None,Black,1;</StyleData><Name>PlotAr" ↙
    & _
        "ea</Name></NamedStyle><NamedStyle><ParentName>Legend.default</ParentName><StyleD" ↙
    & _
        "ata>BackColor=Window;</StyleData><Name>Legend</Name></NamedStyle><NamedStyle><Pa" ↙
    & _
        "rentName>Control</ParentName><StyleData>Border=None,Black,1;</StyleData><Name>Fo" ↙
    & _
        "oter</Name></NamedStyle><NamedStyle><ParentName>Area.default</ParentName><StyleD" ↙
    & _
        "ata /><Name>Area</Name></NamedStyle><NamedStyle><ParentName>Control.default</Par" ↙
    & _
        "entName><StyleData>BackColor=White;</StyleData><Name>Control</Name></NamedStyle>" ↙
    & _
        "<NamedStyle><ParentName>Area</ParentName><StyleData>Rotation=Rotate0;Border=None" ↙
    & _
        ",Transparent,1;AlignHorz=Center;BackColor=Transparent;Opaque=False;Font=Microsof" ↙
    & _
        "t Sans Serif, 8.25pt;AlignVert=Bottom;</StyleData><Name>AxisX</Name></NamedStyle" ↙
    & _
        "><NamedStyle><ParentName>Area</ParentName><StyleData>Rotation=Rotate270;Border=N" ↙
    & _
        "one,Transparent,1;AlignHorz=Near;BackColor=Transparent;Opaque=False;Font=Microso" ↙
    & _
        "ft Sans Serif, 8.25pt;AlignVert=Center;</StyleData><Name>AxisY</Name></NamedStyl" ↙
    & _
        "e><NamedStyle><ParentName>LabelStyleDefault.default</ParentName><StyleData /><Na" ↙
    & _
        "me>LabelStyleDefault</Name></NamedStyle><NamedStyle><ParentName>Control</ParentN" ↙
    & _
        "ame><StyleData>Border=None,Black,1;Wrap=False;AlignVert=Top;</StyleData><Name>Le" ↙
    & _
        "gend.default</Name></NamedStyle><NamedStyle><ParentName>Control</ParentName><Sty" ↙
    & _
        "leData>Border=None,Black,1;BackColor=Transparent;</StyleData><Name>LabelStyleDef" ↙
    & _
        "ault.default</Name></NamedStyle><NamedStyle><ParentName>Control</ParentName><Sty" ↙
    & _
        "leData>Border=None,Black,1;BackColor2=White;BackColor=White;</StyleData><Name>He" ↙
    & _
        "ader</Name></NamedStyle><NamedStyle><ParentName /><StyleData>ForeColor=ControlTe" ↙
    & _
        "xt;Border=None,Black,1;BackColor=Control;</StyleData><Name>Control.default</Name" ↙
    & _
        "></NamedStyle><NamedStyle><ParentName>Area</ParentName><StyleData>Rotation=Rotat" ↙
    & _
        "e90;Border=None,Transparent,1;AlignHorz=Far;BackColor=Transparent;AlignVert=Cent" ↙
    & _
        "er;</StyleData><Name>AxisY2</Name></NamedStyle><NamedStyle><ParentName>Control</" ↙
    & _
        "ParentName><StyleData>Border=None,Black,1;AlignVert=Top;</StyleData><Name>Area.d" ↙
    & _
        "efault</Name></NamedStyle></StyleCollection><Header Compass=""North""><Text>     ↙
    Princi" & _
        "pal Components Loadings</Text></Header><Footer Compass=""South""><Text /></      ↙
    Footer>" & _
        "<Legend Visible=""False"" Compass=""East""><Text /></Legend><ChartArea /><Axes>  ↙
    <Axis" & _
        " UnitMajor=""0.2"" UnitMinor=""0.1"" AutoMajor=""True"" AutoMinor=""True""      ↙
    AutoMax=""True" & _
        """ AutoMin=""True"" Max=""1"" Min=""-1"" _onTop=""0"" Compass=""South"">       ↙
    <GridMajor AutoSpac" & _
        "e=""True"" Color=""LightGray"" Pattern=""Dash"" Thickness=""1"" /><GridMinor   ↙
    AutoSpace=""" & _
        "True"" Color=""LightGray"" Pattern=""Dash"" Thickness=""1"" /><Text /></Axis>  ↙
    <Axis Unit" & _
```

```
        "Major=""0.2"" UnitMinor=""0.1"" AutoMajor=""True"" AutoMinor=""True"" AutoMax="  ↙
    "True"" Aut" & _
        "oMin=""True"" Max=""1"" Min=""-1"" _onTop=""0"" Compass=""West""><GridMajor     ↙
    AutoSpace=""Tru" & _
        "e"" Color=""LightGray"" Pattern=""Dash"" Thickness=""1"" /><GridMinor AutoSpace= ↙
    ""True"" " & _
        "Color=""LightGray"" Pattern=""Dash"" Thickness=""1"" /><Text /></Axis><Axis      ↙
    UnitMajor=" & _
        """0"" UnitMinor=""0"" AutoMajor=""True"" AutoMinor=""True"" AutoMax=""True""     ↙
    AutoMin=""True" & _
        """ Max=""0"" Min=""0"" _onTop=""0"" Compass=""East""><GridMajor AutoSpace=""True ↙
    "" Color=""L" & _
        "ightGray"" Pattern=""Dash"" Thickness=""1"" /><GridMinor AutoSpace=""True"" Color↙
    =""Ligh" & _
        "tGray"" Pattern=""Dash"" Thickness=""1"" /><Text /></Axis></Axes>                ↙
    <ChartGroupsCollecti" & _
        "on><ChartGroup><ShowOutline>True</ShowOutline><HiLoData>FillFalling=True,FillTra"↙
     & _
        "nsparent=True,FullWidth=False,ShowClose=True,ShowOpen=True</HiLoData><ChartType>"↙
     & _
        "XYPlot</ChartType><Name>Group1</Name><Bar>ClusterOverlap=0,ClusterWidth=50</Bar>"↙
     & _
        "<DataSerializer Hole=""3.4028234663852886E+38"" DefaultSet=""True"">              ↙
    <DataSeriesColle" & _
        "ction><DataSeriesSerializer><SeriesLabel>Component One</SeriesLabel><DataTypes>D"↙
     & _
        "ouble;Double;Double;Double;Double</DataTypes><DataFields>;;;;</DataFields><Symbo"↙
     & _
        "lStyle Size=""8"" Color=""Black"" Shape=""Square"" /><X /><Y1 /><Y /><LineStyle  ↙
    Color=" & _
        """DarkKhaki"" Pattern=""None"" Thickness=""1"" /><Tag /><Y2 /><Y3 /></           ↙
    DataSeriesSerial" & _
        "izer><DataSeriesSerializer><SeriesLabel>Component Two</SeriesLabel><DataTypes>Do"↙
     & _
        "uble;Double;Double;Double;Double</DataTypes><DataFields>;;;;</DataFields><Symbol"↙
     & _
        "Style Size=""8"" Color=""Black"" Shape=""Square"" /><X /><Y1 /><Y /><LineStyle   ↙
    Color=""" & _
        "DarkMagenta"" Pattern=""None"" Thickness=""1"" /><Tag /><Y2 /><Y3 /></           ↙
    DataSeriesSeria" & _
        "lizer></DataSeriesCollection></DataSerializer><Bubble>EncodingMethod=Diameter,Ma"↙
     & _
        "ximumSize=20,MinimumSize=5</Bubble><Pie>OtherOffset=0,Start=0</Pie><Polar>Degree"↙
     & _
        "s=True,PiRatioAnnotations=True,Start=0</Polar><Stacked>False</Stacked><Radar>Deg"↙
     & _
        "rees=True,Filled=False,Start=0</Radar><Visible>True</Visible></ChartGroup><Chart"↙
     & _
        "Group><ShowOutline>True</ShowOutline><HiLoData>FillFalling=True,FillTransparent="↙
     & _
        "True,FullWidth=False,ShowClose=True,ShowOpen=True</HiLoData><ChartType>XYPlot</C"↙
     & _
        "hartType><Name>Group2</Name><Bar>ClusterOverlap=0,ClusterWidth=50</Bar><DataSeri"↙
     & _
        "alizer Hole=""3.4028234663852886E+38"" /><Bubble>EncodingMethod=Diameter,        ↙
    MaximumSi" & _
        "ze=20,MinimumSize=5</Bubble><Pie>OtherOffset=0,Start=0</Pie><Polar>Degrees=True,"↙
     & _
        "PiRatioAnnotations=True,Start=0</Polar><Stacked>False</Stacked><Radar>Degrees=Tr"↙
     & _
        "ue,Filled=False,Start=0</Radar><Visible>True</Visible></ChartGroup></ChartGroups"↙
     & _
        "Collection></Chart2DPropBag>"
        Me.chartPCA.Size = New System.Drawing.Size(422, 373)
        Me.chartPCA.TabIndex = 0
        '
        'ContextMenuPlot
        '
        Me.ContextMenuPlot.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.  ↙
    ctxCopy, Me.ctxSaveAs, Me.MenuItem3, Me.ctxPrint, Me.MenuItem6, Me.ctxExit})
        '
        'ctxCopy
        '
        Me.ctxCopy.Index = 0
        Me.ctxCopy.Text = "&Copy"
        '
        'ctxSaveAs
        '
        Me.ctxSaveAs.Index = 1
        Me.ctxSaveAs.Text = "Save &As"
        '
        'MenuItem3
        '
        Me.MenuItem3.Index = 2
        Me.MenuItem3.Text = "-"
        '
        'ctxPrint
        '
        Me.ctxPrint.Index = 3
        Me.ctxPrint.Text = "&Print"
        '
        'MenuItem6
        '
        Me.MenuItem6.Index = 4
        Me.MenuItem6.Text = "-"
        '
        'ctxExit
        '
        Me.ctxExit.Index = 5
        Me.ctxExit.Text = "E&xit"
        '
        'Plot
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(422, 373)
        Me.ContextMenu = Me.ContextMenuPlot
        Me.Controls.Add(Me.chartPCA)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.Name = "Plot"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterParent
        Me.Text = "Plot"
        CType(Me.chartPCA, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private mySamples As Integer
    Private myVariables As Integer
    Private myInput_data As Array
    Private mySampleNames As Array

    Public Property Variables() As Integer
        Get
            Return myVariables
        End Get
        Set(ByVal Value As Integer)
            myVariables = Value
        End Set
    End Property

    Public Property Samples() As Integer
        Get
```

```
            Return mySamples
        End Get
        Set(ByVal Value As Integer)
            mySamples = Value
        End Set
    End Property

    Public Property Input_data() As Array
        Get
            Return myInput_data
        End Get
        Set(ByVal Value As Array)
            myInput_data = Value
        End Set
    End Property

    Public Property SampleNames() As Array
        Get
            Return mySampleNames
        End Get
        Set(ByVal Value As Array)
            mySampleNames = Value
        End Set
    End Property

    Private Sub chartPCA_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles chartPCA.Load

        Dim chartData As C1.Win.C1Chart.ChartDataSeries
        Dim chartDataXY As C1.Win.C1Chart.ChartData
        Dim chartLabels As C1.Win.C1Chart.ChartLabels
        Dim chartLabel As Label
        Dim AxisCounter As Integer
        Dim xAxisData(Samples - 1) As Double
        Dim yAxisData(Samples - 1) As Double
        chartPCA.Style.Border.BorderStyle = C1.Win.C1Chart.BorderStyleEnum.Solid
        chartPCA.Style.Border.Thickness = 1

        For AxisCounter = 0 To Samples - 1
            xAxisData(AxisCounter) = CType(Input_data.GetValue(AxisCounter, 0), Double)
            yAxisData(AxisCounter) = CType(Input_data.GetValue(AxisCounter, 1), Double)
        Next

        chartPCA.ChartGroups(0).ChartData.SeriesList(0).X.CopyDataIn(xAxisData)
        chartPCA.ChartGroups(0).ChartData.SeriesList(0).Y.CopyDataIn(yAxisData)
        chartPCA.ChartArea.AxisX.Text = ControlChars.Lf + "Component One"
        chartPCA.ChartArea.AxisY.Text = "Component Two" + ControlChars.Lf + "    "
        chartPCA.Header.Style.Font = New Font("Arial", 10, FontStyle.Bold)

        'Add +- Lines
        Dim xLowerBound As Integer = xAxisData.GetLowerBound(0)
        Dim xUpperBound As Integer = xAxisData.GetUpperBound(0)
        Dim xMin As Double
        Dim xMax As Double
        Dim maxIndex As Integer = 0
        Dim minIndex As Integer = 0
        Dim yLowerBound As Integer = yAxisData.GetLowerBound(0)
        Dim yUpperBound As Integer = yAxisData.GetUpperBound(0)
        Dim yMin As Double
        Dim yMax As Double
        Dim Counter As Integer

        'Find maximum X value
        xMax = xAxisData(0)
        For Counter = xLowerBound To xUpperBound
            If xAxisData(maxIndex) < xAxisData(Counter) Then
                maxIndex = Counter
                xMax = xAxisData(maxIndex)
            End If
        Next

        'Find minimum X value
        xMin = xAxisData(0)
        For Counter = xLowerBound + 1 To xUpperBound
            If xMin > xAxisData(Counter) Then
                minIndex = Counter
                xMin = xAxisData(minIndex)
            End If
        Next

        'Find maximum Y value
        maxIndex = 0
        For Counter = yLowerBound To yUpperBound
            If yAxisData(maxIndex) < yAxisData(Counter) Then
                maxIndex = Counter
                yMax = yAxisData(maxIndex)
            End If
        Next

        'Find minimum Y value
        yMin = yAxisData(0)
        For Counter = yLowerBound + 1 To yUpperBound
            If yMin > yAxisData(Counter) Then
                minIndex = Counter
                yMin = yAxisData(minIndex)
            End If
        Next

        Dim xMinMod As Integer = CType(xMin, Integer)
        Dim xMaxMod As Integer = CType(xMax, Integer)
        If xMinMod > xMin Then
            xMinMod = xMinMod - 1
        End If
        If xMaxMod < xMax Then
            xMaxMod = xMaxMod + 1
        End If

        Dim yMinMod As Integer = CType(yMin, Integer)
        Dim yMaxMod As Integer = CType(yMax, Integer)
        If yMinMod > yMin Then
            yMinMod = yMinMod - 1
        End If
        If yMaxMod < yMax Then
            yMaxMod = yMaxMod + 1
        End If

        xMinMod = xMinMod - 1
        xMaxMod = xMaxMod + 1
        yMinMod = yMinMod - 1
        yMaxMod = yMaxMod + 1


        chartPCA.ChartArea.AxisX.Min = xMinMod
        chartPCA.ChartArea.AxisX.Max = xMaxMod
        chartPCA.ChartArea.AxisY.Min = yMinMod
        chartPCA.ChartArea.AxisY.Max = yMaxMod

        'Enter data into plot
        Dim group1 As C1.Win.C1Chart.ChartGroup = chartPCA.ChartGroups(0)
        group1.ChartType = C1.Win.C1Chart.Chart2DTypeEnum.XYPlot
        group1.DrawingOrder = 0

        Dim Horizdata As C1.Win.C1Chart.ChartData = group1.ChartData
        Dim sHoriz As New C1.Win.C1Chart.ChartDataSeries
        Horizdata.SeriesList.Add(sHoriz)
        sHoriz.FitType = C1.Win.C1Chart.FitTypeEnum.Line
        sHoriz.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        sHoriz.LineStyle.Color = Color.Black
        Dim pfa() As PointF = {New PointF(xMinMod, 0.0F), New PointF(xMaxMod, 0.0F)}
        sHoriz.PointData.CopyDataIn(pfa)

        'Enter data into plot
        Dim group2 As C1.Win.C1Chart.ChartGroup = chartPCA.ChartGroups(1)
        group2.ChartType = C1.Win.C1Chart.Chart2DTypeEnum.XYPlot
        group2.DrawingOrder = 1
        Dim Verticaldata As C1.Win.C1Chart.ChartData = group2.ChartData

        Dim sVert As New C1.Win.C1Chart.ChartDataSeries
        Verticaldata.SeriesList.Add(sVert)
        sVert.FitType = C1.Win.C1Chart.FitTypeEnum.Line
        sVert.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        sVert.LineStyle.Color = Color.Black
        Dim pfa1() As PointF = {New PointF(0.0F, yMinMod), New PointF(0.0F, yMaxMod)}
        sVert.PointData.CopyDataIn(pfa1)
        chartPCA.ChartArea.AxisY2.Visible = False

        'Make box around graph
        sVert = New ChartDataSeries
        Verticaldata.SeriesList.Add(sVert)
        pfa1 = New PointF() {New PointF(xMaxMod, yMinMod), New PointF(xMaxMod, yMaxMod)}
        sVert.PointData.CopyDataIn(pfa1)
        sVert.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        sVert.LineStyle.Color = Color.Black
        sVert.LineStyle.Thickness = 2

        sHoriz = New ChartDataSeries
        Horizdata.SeriesList.Add(sHoriz)
        pfa1 = New PointF() {New PointF(xMinMod, yMaxMod), New PointF(xMaxMod, yMaxMod)}
        sHoriz.PointData.CopyDataIn(pfa1)
        sHoriz.SymbolStyle.Shape = C1.Win.C1Chart.SymbolShapeEnum.None
        sHoriz.LineStyle.Color = Color.Black
        sHoriz.LineStyle.Thickness = 3


        'Add Sample Names to Labels Collection
        Dim cLabs As ChartLabels = chartPCA.ChartLabels
        cLabs.DefaultLabelStyle.BackColor = Color.Transparent
        cLabs.DefaultLabelStyle.Border.BorderStyle = BorderStyleEnum.Empty
        cLabs.DefaultLabelStyle.Border.Thickness = 0
        Dim MyValue(SampleNames.GetUpperBound(0)) As Integer

        For Counter = 0 To SampleNames.GetUpperBound(0)
            'Make a random number for the direction and distance offset.

            Randomize() ' Initialize random-number generator.
            MyValue(Counter) = CInt(Int((10 * Rnd()) + 1)) ' Generate random value between↙
    1 and 6.
            Dim cLab As C1.Win.C1Chart.Label = cLabs.LabelsCollection.AddNewLabel()
            cLab.Text = SampleNames.GetValue(Counter).ToString
            cLab.AttachMethod = AttachMethodEnum.DataIndex
            cLab.AttachMethodData.GroupIndex = 0
            cLab.AttachMethodData.SeriesIndex = 0
            cLab.AttachMethodData.PointIndex = Counter
            cLab.Connected = True
            cLab.Offset = (MyValue(Counter) * 4)
            cLab.Visible = True
            cLab.Compass = LabelCompassEnum.Orthogonal
            'cLab.Compass = CType(MyValue(Counter), LabelCompassEnum)
            'If xAxisData(Counter) > 0 Then
            '    cLab.Compass = LabelCompassEnum.NorthWest
            'Else
            '    cLab.Compass = LabelCompassEnum.NorthEast
            'End If
        Next


    End Sub

    Private Sub mnuClose_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)
        Me.Close()
    End Sub

    Private Sub ctxSaveAs_Click(ByVal sender As System.Object, ByVal e As System.       ↙
    EventArgs) Handles ctxSaveAs.Click
        Dim lastFilterIndex As Integer = 1
        Dim myPlot As Plot = Me
        Dim sfg As New SaveFileDialog

        sfg.Filter = "Metafiles (*.emf)|*.emf|" + "Bmp files (*.bmp)|*.bmp|" + "Gif files ↙
    (*.gif)|*.gif|" + "Jpeg files (*.jpg;*.jpeg)|*.jpg;*.jpeg|" + "Png files (*.png)|*.png↙
    |" + "All graphic files (*.emf;*.bmp;*.gif;*.jpg;*.jpeg;*.png)|*.emf;*.bmp;*.gif;*.jpg↙
    ;*.jpeg;*.png"
        sfg.FilterIndex = lastFilterIndex
        sfg.OverwritePrompt = True
        sfg.CheckPathExists = True
        sfg.RestoreDirectory = False
        sfg.ValidateNames = True

        If sfg.ShowDialog() = DialogResult.OK Then
            Dim fn As String = sfg.FileName
            Dim indext As Integer = fn.LastIndexOf("."c)
            If indext < 0 Then
                indext = fn.Length + 1
                fn += ".emf"
            Else
                indext += 1
            End If
            Dim ext As String = fn.Substring(indext)
            Dim imgfmt As ImageFormat = Nothing

            Select Case ext
                Case "emf"
                    imgfmt = ImageFormat.Emf
                    myPlot.chartPCA.SaveImage(fn, imgfmt)

                Case "bmp"
                    imgfmt = ImageFormat.Bmp

                Case "gif"
                    imgfmt = ImageFormat.Gif

                Case "jpeg", "jpg"
                    imgfmt = ImageFormat.Jpeg

                Case "png"
                    imgfmt = ImageFormat.Png

                Case Else
                    Return
            End Select

            lastFilterIndex = sfg.FilterIndex

            If Not imgfmt.Equals(ImageFormat.Emf) Then
                Dim img As Image = myPlot.chartPCA.GetImage()
                img.Save(fn, imgfmt)
                img.Dispose()
            End If
        End If
        sfg.Dispose()
    End Sub

    Private Sub ctxCopy_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxCopy.Click
        Dim myPlot As Plot = Me
        myPlot.chartPCA.SaveImage(ImageFormat.Emf)

    End Sub

    Private Sub ctxExit_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxExit.Click
        Me.Close()
    End Sub

    Private Sub chartPCA_Click(ByVal sender As Object, ByVal e As System.EventArgs)       ↙
    Handles chartPCA.Click
        Me.Activate()
    End Sub

    Private Sub ctxPrint_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)↙
     Handles ctxPrint.Click
        Dim doc As New C1PrintDocument
        Doc2D_PCA(doc, New GenerateEventArgs)
        Dim aprev As New Final_Report
        AddHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_PCA)
        aprev.C1PrintPreview1.Document = doc
        aprev.ShowDialog()
        RemoveHandler doc.GenerateDocument, New GenerateEventHandler(AddressOf Doc2D_PCA)
        aprev.Dispose()
        'barChart.chartBar.PrintChart(PrintScaleEnum.ScaleToFit)

    End Sub

    Private Sub Doc2D_PCA(ByVal doc As C1PrintDocument, ByVal e As GenerateEventArgs)
        Dim C1Chart1Raw As Plot = Me
        Dim C1Chart1 As C1.Win.C1Chart.C1Chart = C1Chart1Raw.chartPCA
        With doc
            .DefaultUnit = UnitTypeEnum.Mm
            .StartDoc()
            '.RenderBlockText("Chart", 50, 50, Nothing)
            Dim ww As Double = (CType(.BodyAreaSize.Width, Double)) * 0.9
            .RenderBlockC1Printable(C1Chart1, (.BodyAreaSize.Width * 0.9))
            .CanChangePageMetrics()
            .RenderBlockGraphicsBegin()
            .EndDoc()
        End With
    End Sub

End Class
```

```
Public Class Properties
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents Label1 As System.Windows.Forms.Label
    Friend WithEvents btnOK As System.Windows.Forms.Button
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.        ↙
    ResourceManager(GetType(Properties))
        Me.Label1 = New System.Windows.Forms.Label
        Me.btnOK = New System.Windows.Forms.Button
        Me.SuspendLayout()
        '
        'Label1
        '
        Me.Label1.Font = New System.Drawing.Font("Microsoft Sans Serif", 10.0!, System.  ↙
    Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, CType(0, Byte))
        Me.Label1.Location = New System.Drawing.Point(16, 40)
        Me.Label1.Name = "Label1"
        Me.Label1.Size = New System.Drawing.Size(264, 160)
        Me.Label1.TabIndex = 0
        Me.Label1.Text = "There are currently no user settable properties for this          ↙
    application"
        '
        'btnOK
        '
        Me.btnOK.DialogResult = System.Windows.Forms.DialogResult.Cancel
        Me.btnOK.Location = New System.Drawing.Point(105, 208)
        Me.btnOK.Name = "btnOK"
        Me.btnOK.TabIndex = 1
        Me.btnOK.Text = "&OK"
        '
        'Properties
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(292, 273)
        Me.ControlBox = False
        Me.Controls.Add(Me.btnOK)
        Me.Controls.Add(Me.Label1)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.MaximizeBox = False
        Me.Name = "Properties"
        Me.Text = "Properties"
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private Sub btnOK_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)   ↙
    Handles btnOK.Click
        Me.Close()
    End Sub
End Class
```

```
Imports C1.Win.C1FlexGrid
Imports System.Text.RegularExpressions

Public Class Select_Samples
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call.

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents btnSelectAll As System.Windows.Forms.Button
    Friend WithEvents btnSelectNone As System.Windows.Forms.Button
    Friend WithEvents btnSelectSamplesOK As System.Windows.Forms.Button
    Friend WithEvents btnSelectSamplesCancel As System.Windows.Forms.Button
    Friend WithEvents SelectSamples As C1.Win.C1FlexGrid.C1FlexGrid
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.
    ResourceManager(GetType(Select_Samples))
        Me.SelectSamples = New C1.Win.C1FlexGrid.C1FlexGrid
        Me.btnSelectAll = New System.Windows.Forms.Button
        Me.btnSelectNone = New System.Windows.Forms.Button
        Me.btnSelectSamplesOK = New System.Windows.Forms.Button
        Me.btnSelectSamplesCancel = New System.Windows.Forms.Button
        CType(Me.SelectSamples, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'SelectSamples
        '
        Me.SelectSamples.AllowSorting = C1.Win.C1FlexGrid.AllowSortingEnum.None
        Me.SelectSamples.BackColor = System.Drawing.SystemColors.Window
        Me.SelectSamples.ColumnInfo = "3,0,0,0,0,85,Columns:0{Visible:False;}" & Microsoft
    .VisualBasic.ChrW(9) & "1{Width:37;AllowSorting:False;AllowDraggin" & _
        "g:False;AllowResizing:False;DataType:System.Boolean;ImageAlign:CenterCenter;}" & 
    Microsoft.VisualBasic.ChrW(9) & "2{" & _
        "Width:175;Caption:""Sample"";AllowDragging:False;AllowResizing:False;AllowMerging
    :" & _
        "True;AllowEditing:False;TextAlign:LeftCenter;TextAlignFixed:CenterCenter;}" & 
    Microsoft.VisualBasic.ChrW(9)
        Me.SelectSamples.ForeColor = System.Drawing.SystemColors.WindowText
        Me.SelectSamples.Location = New System.Drawing.Point(16, 16)
        Me.SelectSamples.Name = "SelectSamples"
        Me.SelectSamples.Rows.Count = 750
        Me.SelectSamples.Size = New System.Drawing.Size(232, 440)
        Me.SelectSamples.Styles = New C1.Win.C1FlexGrid.CellStyleCollection("Fixed          ↙
    {BackColor:Control;ForeColor:ControlText;Border:Flat,1,ControlDark,Both;}" & Microsoft↙
    .VisualBasic.ChrW(9) & "Hi" & _
        "ghlight{BackColor:Highlight;ForeColor:HighlightText;}" & Microsoft.VisualBasic.  ↙
    ChrW(9) & "Search{BackColor:Highlight" & _
        ";ForeColor:HighlightText;}" & Microsoft.VisualBasic.ChrW(9) & "Frozen{BackColor: ↙
    Beige;}" & Microsoft.VisualBasic.ChrW(9) & "EmptyArea{BackColor:AppWorks" & _
        "pace;Border:Flat,1,ControlDarkDark,Both;}" & Microsoft.VisualBasic.ChrW(9) &     ↙
    "GrandTotal{BackColor:Black;ForeColor:W" & _
        "hite;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal0{BackColor:ControlDarkDark;  ↙
    ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal1{BackColor" & _
        ":ControlDarkDark;ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal2 ↙
    {BackColor:ControlDarkDark;ForeColor" & _
        ":White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal3{BackColor:ControlDarkDark;↙
    ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal4{BackCol" & _
        "or:ControlDarkDark;ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) &          ↙
    "Subtotal5{BackColor:ControlDarkDark;ForeCol" & _
        "or:White;}" & Microsoft.VisualBasic.ChrW(9))
        Me.SelectSamples.TabIndex = 0
        '
        'btnSelectAll
        '
        Me.btnSelectAll.Location = New System.Drawing.Point(264, 32)
        Me.btnSelectAll.Name = "btnSelectAll"
        Me.btnSelectAll.TabIndex = 1
        Me.btnSelectAll.Text = "Select &All"
        '
        'btnSelectNone
        '
        Me.btnSelectNone.Location = New System.Drawing.Point(264, 88)
        Me.btnSelectNone.Name = "btnSelectNone"
        Me.btnSelectNone.TabIndex = 2
        Me.btnSelectNone.Text = "Select &None"
        '
        'btnSelectSamplesOK
        '
        Me.btnSelectSamplesOK.DialogResult = System.Windows.Forms.DialogResult.OK
        Me.btnSelectSamplesOK.Location = New System.Drawing.Point(264, 360)
        Me.btnSelectSamplesOK.Name = "btnSelectSamplesOK"
        Me.btnSelectSamplesOK.TabIndex = 3
        Me.btnSelectSamplesOK.Text = "&OK"
        '
        'btnSelectSamplesCancel
        '
        Me.btnSelectSamplesCancel.DialogResult = System.Windows.Forms.DialogResult.Cancel
        Me.btnSelectSamplesCancel.Location = New System.Drawing.Point(264, 416)
        Me.btnSelectSamplesCancel.Name = "btnSelectSamplesCancel"
        Me.btnSelectSamplesCancel.TabIndex = 4
        Me.btnSelectSamplesCancel.Text = "&Cancel"
        '
        'Select_Samples
        '
        Me.AcceptButton = Me.btnSelectSamplesOK
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.CancelButton = Me.btnSelectSamplesCancel
        Me.ClientSize = New System.Drawing.Size(360, 469)
        Me.ControlBox = False
        Me.Controls.Add(Me.btnSelectSamplesCancel)
        Me.Controls.Add(Me.btnSelectSamplesOK)
        Me.Controls.Add(Me.btnSelectNone)
        Me.Controls.Add(Me.btnSelectAll)
        Me.Controls.Add(Me.SelectSamples)
        Me.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedDialog
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.MaximizeBox = False
        Me.MinimizeBox = False
        Me.Name = "Select_Samples"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterParent
        Me.Text = "SelectSamples"
        CType(Me.SelectSamples, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region


    Private mSampleChoice As String
    Public Property SampleChoice() As String
        Get
            Return CType(mSampleChoice, String)
        End Get
        Set(ByVal Value As String)
            mSampleChoice = Value
        End Set
    End Property


    Private mSamples As String
    Public Property samples() As String
        Get
            Return CType(mSamples, String)
        End Get
        Set(ByVal Value As String)
            mSamples = Value
        End Set
    End Property


    Private Sub SelectSamples_Load(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles MyBase.Load

        Dim sampleNamesCellRange As CellRange
        sampleNamesCellRange = Me.SelectSamples.GetCellRange(1, 2, CType(Me.SelectSamples.↙
    Rows.Count, Integer) - 1, 2)
        sampleNamesCellRange.Clip = samples
        SelectSamples.Select(SelectSamples.Row, SelectSamples.Col)

        Dim i, j As Integer
        j = 1
        For i = 1 To CType(Me.SelectSamples.Rows.Count, Integer) - 1
            If Not SelectSamples(i, 2) Is Nothing Then
                j = j + 1
            End If

        Next

        sampleNamesCellRange = Me.SelectSamples.GetCellRange(1, 1, j - 1, 2)
        SampleChoice = sampleNamesCellRange.Clip


    End Sub

    Private Sub btnSelectAll_Click(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles btnSelectAll.Click

        Dim i, j As Integer
        j = 1
        For i = 1 To CType(Me.SelectSamples.Rows.Count, Integer) - 1
            If Not SelectSamples(i, 2) Is Nothing Then
                j = j + 1
            End If

        Next
        For i = 1 To j - 1
            SelectSamples(i, 1) = True
        Next

    End Sub

    Private Sub btnSelectNone_Click(ByVal sender As System.Object, ByVal e As System.     ↙
    EventArgs) Handles btnSelectNone.Click

        Dim i As Integer
        For i = 1 To CType(Me.SelectSamples.Rows.Count, Integer) - 1
            SelectSamples(i, 1) = False
        Next

    End Sub

    Private Sub btnSelectSamplesOK_Click(ByVal sender As System.Object, ByVal e As System.↙
    EventArgs) Handles btnSelectSamplesOK.Click

        Dim sampleNamesCellRange As CellRange
        sampleNamesCellRange = Me.SelectSamples.GetCellRange(1, 2, CType(Me.SelectSamples.↙
    Rows.Count, Integer) - 1, 2)
        sampleNamesCellRange.Clip = samples
        SelectSamples.Select(SelectSamples.Row, SelectSamples.Col)
        Dim i, j As Integer
        j = 1
        For i = 1 To CType(Me.SelectSamples.Rows.Count, Integer) - 1
            If Not SelectSamples(i, 2) Is Nothing Then
                j = j + 1
            End If

        Next

        sampleNamesCellRange = Me.SelectSamples.GetCellRange(1, 1, j - 1, 2)
        SampleChoice = sampleNamesCellRange.Clip


    End Sub
End Class
```

```
Imports C1.C1PrintDocument

Public Class Text_Output

    Inherits System.Windows.Forms.Form
    Private myInputText As String
    Private myInputVariances As Array
    Private myInputT2 As Array
    Private myInputpcs As Array
    Private myInputnewdata As Array
    Private myInputManovap As Array
    Private myInputManovad As Array
    Private myInputManovastats As Array
    Private myInputpdist As Array
    Private myInputlinkage As Array
    Private myString As String

    Public ReadOnly Property StringContents() As String
        Get
            Return myString
        End Get
    End Property



    Public Property InputText() As String
        Get
            Return myInputText
        End Get
        Set(ByVal Value As String)
            myInputText = Value
        End Set
    End Property

    Public Property InputVariances() As Array
        Get
            Return myInputVariances
        End Get
        Set(ByVal Value As Array)
            myInputVariances = Value
        End Set
    End Property

    Public Property InputT2() As Array
        Get
            Return myInputT2
        End Get
        Set(ByVal Value As Array)
            myInputT2 = Value
        End Set
    End Property

    Public Property Inputpcs() As Array
        Get
            Return myInputpcs
        End Get
        Set(ByVal Value As Array)
            myInputpcs = Value
        End Set
    End Property

    Public Property Inputnewdata() As Array
        Get
            Return myInputnewdata
        End Get
        Set(ByVal Value As Array)
            myInputnewdata = Value
        End Set
    End Property

    Public Property InputManovap() As Array
        Get
            Return myInputManovap
        End Get
        Set(ByVal Value As Array)
            myInputManovap = Value
        End Set
    End Property

    Public Property InputManovad() As Array
        Get
            Return myInputManovad
        End Get
        Set(ByVal Value As Array)
            myInputManovad = Value
        End Set
    End Property

    Public Property InputManovastats() As Array
        Get
            Return myInputManovastats
        End Get
        Set(ByVal Value As Array)
            myInputManovastats = Value
        End Set
    End Property

    Public Property Inputpdist() As Array
        Get
            Return myInputpdist
        End Get
        Set(ByVal Value As Array)
            myInputpdist = Value
        End Set
    End Property

    Public Property Inputlinkage() As Array
        Get
            Return myInputlinkage
        End Get
        Set(ByVal Value As Array)
            myInputlinkage = Value
        End Set
    End Property


#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents dataReport As System.Windows.Forms.RichTextBox
    Friend WithEvents ContextMenuTextOutput As System.Windows.Forms.ContextMenu
    Friend WithEvents ctxCopy As System.Windows.Forms.MenuItem
    Friend WithEvents ctxSaveAs As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem3 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxPrint As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem5 As System.Windows.Forms.MenuItem
    Friend WithEvents ctxExit As System.Windows.Forms.MenuItem
    Friend WithEvents TextDoc As C1.C1PrintDocument.C1PrintDocument
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.  ↙
    ResourceManager(GetType(Text_Output))
        Me.dataReport = New System.Windows.Forms.RichTextBox
        Me.ContextMenuTextOutput = New System.Windows.Forms.ContextMenu
        Me.ctxCopy = New System.Windows.Forms.MenuItem
        Me.ctxSaveAs = New System.Windows.Forms.MenuItem
        Me.MenuItem3 = New System.Windows.Forms.MenuItem
        Me.ctxPrint = New System.Windows.Forms.MenuItem
        Me.MenuItem5 = New System.Windows.Forms.MenuItem
        Me.ctxExit = New System.Windows.Forms.MenuItem
        Me.TextDoc = New C1.C1PrintDocument.C1PrintDocument
        Me.SuspendLayout()
        '
        'dataReport
        '
        Me.dataReport.ContextMenu = Me.ContextMenuTextOutput
        Me.dataReport.Dock = System.Windows.Forms.DockStyle.Fill
        Me.dataReport.Font = New System.Drawing.Font("Times New Roman", 12.0!, System.  ↙
    Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, CType(0, Byte))
        Me.dataReport.Location = New System.Drawing.Point(0, 0)
        Me.dataReport.Name = "dataReport"
        Me.dataReport.Size = New System.Drawing.Size(552, 533)
        Me.dataReport.TabIndex = 0
        Me.dataReport.Text = ""
        '
        'ContextMenuTextOutput
        '
        Me.ContextMenuTextOutput.MenuItems.AddRange(New System.Windows.Forms.MenuItem()  ↙
    {Me.ctxCopy, Me.ctxSaveAs, Me.MenuItem3, Me.ctxPrint, Me.MenuItem5, Me.ctxExit})
        '
        'ctxCopy
        '
        Me.ctxCopy.Index = 0
        Me.ctxCopy.Text = "&Copy"
        '
        'ctxSaveAs
        '
        Me.ctxSaveAs.Index = 1
        Me.ctxSaveAs.Text = "Save &As"
        '
        'MenuItem3
        '
        Me.MenuItem3.Index = 2
        Me.MenuItem3.Text = "-"
        '
        'ctxPrint
        '
        Me.ctxPrint.Index = 3
        Me.ctxPrint.Text = "&Print"
        '
        'MenuItem5
        '
        Me.MenuItem5.Index = 4
        Me.MenuItem5.Text = "-"
        '
        'ctxExit
        '
        Me.ctxExit.Index = 5
        Me.ctxExit.Text = "E&xit"
        '
        'TextDoc
        '
        Me.TextDoc.C1DPageSettings = "color:False;landscape:False;margins:100,100,100,100;↙
    papersize:850,1100,TABlAHQAdA" & _
        "BlAHIA"
        Me.TextDoc.ColumnSpacingStr = "0.5in"
        Me.TextDoc.ColumnSpacingUnit.DefaultType = True
        Me.TextDoc.ColumnSpacingUnit.UnitValue = "0.5in"
        Me.TextDoc.DefaultUnit = C1.C1PrintDocument.UnitTypeEnum.Inch
        Me.TextDoc.DocumentName = ""
        '
        'Text_Output
        '
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.ClientSize = New System.Drawing.Size(552, 533)
        Me.ContextMenu = Me.ContextMenuTextOutput
        Me.Controls.Add(Me.dataReport)
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.Name = "Text_Output"
        Me.Text = "Text_Output"
        Me.ResumeLayout(False)

    End Sub

#End Region


    Private Sub ctxExit_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxExit.Click
        Me.Close()
    End Sub

    Private Sub Text_Output_Click(ByVal sender As Object, ByVal e As System.EventArgs)     ↙
    Handles MyBase.Click
        Me.Activate()
    End Sub

    Private Sub Text_Output_Closed(ByVal sender As Object, ByVal e As System.EventArgs)    ↙
    Handles MyBase.Closed
        Me.Invalidate()
        Me.Finalize()
    End Sub

    Private Sub ctxCopy_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) ↙
    Handles ctxCopy.Click
        Dim Selection As String = Me.dataReport.SelectedText
        Clipboard.SetDataObject(Selection)

    End Sub

    Private Sub ctxSaveAs_Click(ByVal sender As System.Object, ByVal e As System.         ↙
    EventArgs) Handles ctxSaveAs.Click
        Dim TextOutput As Text_Output = Me
        Dim saveFileDlg As New SaveFileDialog
        saveFileDlg.Filter = "Text files (*.txt)|*.txt|All files (*.*)|*.*"
        saveFileDlg.FilterIndex = 1
        saveFileDlg.FileName = saveFileDlg.FileName
        If saveFileDlg.ShowDialog() = DialogResult.OK Then
            TextOutput.dataReport.SaveFile(saveFileDlg.FileName)
        End If

    End Sub


    Private Sub dataReport_VisibleChanged(ByVal sender As Object, ByVal e As System.      ↙
    EventArgs) Handles dataReport.VisibleChanged
        Me.Activate()
    End Sub

    Private Sub dataReport_GotFocus(ByVal sender As Object, ByVal e As System.EventArgs)  ↙
    Handles dataReport.GotFocus
        Me.Activate()
    End Sub

    Private Sub ctxPrint_Click(ByVal sender As System.Object, ByVal e As System.EventArgs)↙
     Handles ctxPrint.Click
        Dim text As String = Me.InputText.ToString
        Dim TextOutput As Text_Output = CType(Me.ActiveMdiChild, Text_Output)
        Dim s As C1.C1PrintDocument.C1DocStyle
        Dim doc As New C1PrintDocument
        With Me.TextDoc
            .Style.Font = New Font("Times New Roman", 12, FontStyle.Regular)
            With .PageHeader
                '.RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Right
                '.RenderText.Text = "Header - Page [@@PageNo@@] of [@@PageCount@@]"
                .Height = 0
            End With
            With .PageFooter
                .RenderText.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Right
                .RenderText.Style.TextAlignVert = C1.C1PrintDocument.AlignVertEnum.Bottom
                .RenderText.Text = "Page [@@PageNo@@] of [@@PageCount@@]"
            End With
            .StartDoc()
            .Style.TextColor = Color.Black
            '.Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Justify
            .RenderBlockText(text)
            .Style.TextAlignHorz = C1.C1PrintDocument.AlignHorzEnum.Left
            .EndDoc()
        End With

        Dim aprev As New Final_Report
        aprev.C1PrintPreview1.Document = Me.TextDoc
        aprev.ShowDialog()
        aprev.Dispose()


    End Sub
End Class
```

```
Imports C1.Win.C1FlexGrid

Public Class Variable_Names
    Inherits System.Windows.Forms.Form

#Region " Windows Form Designer generated code "

    Public Sub New()
        MyBase.New()

        'This call is required by the Windows Form Designer.
        InitializeComponent()

        'Add any initialization after the InitializeComponent() call

    End Sub

    'Form overrides dispose to clean up the component list.
    Protected Overloads Overrides Sub Dispose(ByVal disposing As Boolean)
        If disposing Then
            If Not (components Is Nothing) Then
                components.Dispose()
            End If
        End If
        MyBase.Dispose(disposing)
    End Sub

    'Required by the Windows Form Designer
    Private components As System.ComponentModel.IContainer

    'NOTE: The following procedure is required by the Windows Form Designer
    'It can be modified using the Windows Form Designer.
    'Do not modify it using the code editor.
    Friend WithEvents VariableNames As C1.Win.C1FlexGrid.C1FlexGrid
    Friend WithEvents btnOpenCompoundList As System.Windows.Forms.Button
    Friend WithEvents btnSaveCompoundList As System.Windows.Forms.Button
    Friend WithEvents btnNameVariablesOK As System.Windows.Forms.Button
    Friend WithEvents Label1 As System.Windows.Forms.Label
    Friend WithEvents GroupBox1 As System.Windows.Forms.GroupBox
    Friend WithEvents btnNameVariablesCancel As System.Windows.Forms.Button
    Friend WithEvents ContextMenu1 As System.Windows.Forms.ContextMenu
    Friend WithEvents MenuItem1 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem2 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem3 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem4 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem5 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem6 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem7 As System.Windows.Forms.MenuItem
    Friend WithEvents MenuItem8 As System.Windows.Forms.MenuItem
    <System.Diagnostics.DebuggerStepThrough()> Private Sub InitializeComponent()
        Dim resources As System.Resources.ResourceManager = New System.Resources.    ↙
    ResourceManager(GetType(Variable_Names))
        Me.VariableNames = New C1.Win.C1FlexGrid.C1FlexGrid
        Me.btnOpenCompoundList = New System.Windows.Forms.Button
        Me.btnSaveCompoundList = New System.Windows.Forms.Button
        Me.btnNameVariablesOK = New System.Windows.Forms.Button
        Me.Label1 = New System.Windows.Forms.Label
        Me.GroupBox1 = New System.Windows.Forms.GroupBox
        Me.btnNameVariablesCancel = New System.Windows.Forms.Button
        Me.ContextMenu1 = New System.Windows.Forms.ContextMenu
        Me.MenuItem1 = New System.Windows.Forms.MenuItem
        Me.MenuItem2 = New System.Windows.Forms.MenuItem
        Me.MenuItem3 = New System.Windows.Forms.MenuItem
        Me.MenuItem4 = New System.Windows.Forms.MenuItem
        Me.MenuItem5 = New System.Windows.Forms.MenuItem
        Me.MenuItem6 = New System.Windows.Forms.MenuItem
        Me.MenuItem7 = New System.Windows.Forms.MenuItem
        Me.MenuItem8 = New System.Windows.Forms.MenuItem
        CType(Me.VariableNames, System.ComponentModel.ISupportInitialize).BeginInit()
        Me.SuspendLayout()
        '
        'VariableNames
        '
        Me.VariableNames.AllowSorting = C1.Win.C1FlexGrid.AllowSortingEnum.None
        Me.VariableNames.BackColor = System.Drawing.SystemColors.Window
        Me.VariableNames.ColumnInfo = "1,0,0,0,0,85,Columns:0{Width:172;AllowSorting:False↙
    ;Name:""Compound"";Caption:""Comp" & _
        "ound"";TextAlign:LeftCenter;}" & Microsoft.VisualBasic.ChrW(9)
        Me.VariableNames.ForeColor = System.Drawing.SystemColors.WindowText
        Me.VariableNames.KeyActionTab = C1.Win.C1FlexGrid.KeyActionEnum.MoveAcross
        Me.VariableNames.Location = New System.Drawing.Point(8, 8)
        Me.VariableNames.Name = "VariableNames"
        Me.VariableNames.Size = New System.Drawing.Size(192, 384)
        Me.VariableNames.Styles = New C1.Win.C1FlexGrid.CellStyleCollection("Fixed          ↙
    {BackColor:Control;ForeColor:ControlText;Border:Flat,1,ControlDark,Both;}" & Microsoft↙
    .VisualBasic.ChrW(9) & "Hi" & _
        "ghlight{BackColor:Highlight;ForeColor:HighlightText;}" & Microsoft.VisualBasic.  ↙
    ChrW(9) & "Search{BackColor:Highlight" & _
        ";ForeColor:HighlightText;}" & Microsoft.VisualBasic.ChrW(9) & "Frozen{BackColor: ↙
    Beige;}" & Microsoft.VisualBasic.ChrW(9) & "EmptyArea{BackColor:AppWorks" & _
        "pace;Border:Flat,1,ControlDarkDark,Both;}" & Microsoft.VisualBasic.ChrW(9) &     ↙
    "GrandTotal{BackColor:Black;ForeColor:W" & _
        "hite;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal0{BackColor:ControlDarkDark;  ↙
    ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal1{BackColor" & _
        ":ControlDarkDark;ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal2 ↙
    {BackColor:ControlDarkDark;ForeColor" & _
        ":White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal3{BackColor:ControlDarkDark;↙
    ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) & "Subtotal4{BackCol" & _
        "or:ControlDarkDark;ForeColor:White;}" & Microsoft.VisualBasic.ChrW(9) &          ↙
    "Subtotal5{BackColor:ControlDarkDark;ForeCol" & _
        "or:White;}" & Microsoft.VisualBasic.ChrW(9))
        Me.VariableNames.TabIndex = 0
        '
        'btnOpenCompoundList
        '
        Me.btnOpenCompoundList.Location = New System.Drawing.Point(240, 200)
        Me.btnOpenCompoundList.Name = "btnOpenCompoundList"
        Me.btnOpenCompoundList.TabIndex = 1
        Me.btnOpenCompoundList.Text = "O&pen"
        '
        'btnSaveCompoundList
        '
        Me.btnSaveCompoundList.Location = New System.Drawing.Point(240, 256)
        Me.btnSaveCompoundList.Name = "btnSaveCompoundList"
        Me.btnSaveCompoundList.TabIndex = 2
        Me.btnSaveCompoundList.Text = "&Save"
        '
        'btnNameVariablesOK
        '
        Me.btnNameVariablesOK.DialogResult = System.Windows.Forms.DialogResult.OK
        Me.btnNameVariablesOK.Location = New System.Drawing.Point(240, 320)
        Me.btnNameVariablesOK.Name = "btnNameVariablesOK"
        Me.btnNameVariablesOK.TabIndex = 3
        Me.btnNameVariablesOK.Text = "&OK"
        '
        'Label1
        '
        Me.Label1.Font = New System.Drawing.Font("Tahoma", 9.75!, System.Drawing.FontStyle↙
    .Regular, System.Drawing.GraphicsUnit.Point, CType(0, Byte))
        Me.Label1.Location = New System.Drawing.Point(228, 24)
        Me.Label1.Name = "Label1"
        Me.Label1.Size = New System.Drawing.Size(100, 128)
        Me.Label1.TabIndex = 4
        Me.Label1.Text = "Please type in each compound name you wish to include - in      ↙
```

```
elution order"
        '
        'GroupBox1
        '
        Me.GroupBox1.Location = New System.Drawing.Point(216, 168)
        Me.GroupBox1.Name = "GroupBox1"
        Me.GroupBox1.Size = New System.Drawing.Size(128, 128)
        Me.GroupBox1.TabIndex = 5
        Me.GroupBox1.TabStop = False
        Me.GroupBox1.Text = "Compound Lists"
        '
        'btnNameVariablesCancel
        '
        Me.btnNameVariablesCancel.DialogResult = System.Windows.Forms.DialogResult.Cancel
        Me.btnNameVariablesCancel.Location = New System.Drawing.Point(240, 368)
        Me.btnNameVariablesCancel.Name = "btnNameVariablesCancel"
        Me.btnNameVariablesCancel.TabIndex = 6
        Me.btnNameVariablesCancel.Text = "&Cancel"
        '
        'ContextMenu1
        '
        Me.ContextMenu1.MenuItems.AddRange(New System.Windows.Forms.MenuItem() {Me.     ✓
    MenuItem1, Me.MenuItem2, Me.MenuItem3, Me.MenuItem4, Me.MenuItem5, Me.MenuItem6, Me. ✓
    MenuItem7, Me.MenuItem8})
        '
        'MenuItem1
        '
        Me.MenuItem1.Index = 0
        Me.MenuItem1.Text = "Cu&t"
        '
        'MenuItem2
        '
        Me.MenuItem2.Index = 1
        Me.MenuItem2.Text = "&Copy"
        '
        'MenuItem3
        '
        Me.MenuItem3.Index = 2
        Me.MenuItem3.Text = "&Paste"
        '
        'MenuItem4
        '
        Me.MenuItem4.Index = 3
        Me.MenuItem4.Text = "Paste &Special"
        '
        'MenuItem5
        '
        Me.MenuItem5.Index = 4
        Me.MenuItem5.Text = "-"
        '
        'MenuItem6
        '
        Me.MenuItem6.Index = 5
        Me.MenuItem6.Text = "Select &All"
        '
        'MenuItem7
        '
        Me.MenuItem7.Index = 6
        Me.MenuItem7.Text = "-"
        '
        'MenuItem8
        '
        Me.MenuItem8.Index = 7
        Me.MenuItem8.Text = "&Format"
        '
        'Variable_Names
        '
        Me.AcceptButton = Me.btnNameVariablesOK
        Me.AutoScaleBaseSize = New System.Drawing.Size(5, 13)
        Me.CancelButton = Me.btnNameVariablesCancel
        Me.ClientSize = New System.Drawing.Size(352, 413)
        Me.ControlBox = False
        Me.Controls.Add(Me.btnNameVariablesCancel)
        Me.Controls.Add(Me.Label1)
        Me.Controls.Add(Me.btnNameVariablesOK)
        Me.Controls.Add(Me.btnSaveCompoundList)
        Me.Controls.Add(Me.btnOpenCompoundList)
        Me.Controls.Add(Me.VariableNames)
        Me.Controls.Add(Me.GroupBox1)
        Me.FormBorderStyle = System.Windows.Forms.FormBorderStyle.FixedDialog
        Me.Icon = CType(resources.GetObject("$this.Icon"), System.Drawing.Icon)
        Me.MaximizeBox = False
        Me.Name = "Variable_Names"
        Me.StartPosition = System.Windows.Forms.FormStartPosition.CenterParent
        Me.Text = "Name Variables"
        CType(Me.VariableNames, System.ComponentModel.ISupportInitialize).EndInit()
        Me.ResumeLayout(False)

    End Sub

#End Region

    Private Sub Variable_Names_Load(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles MyBase.Load

    End Sub

    Public Sub ReturnVariableNames(ByVal VariableNameList As Object)
        Dim mVariableNamesRows As Integer
        mVariableNamesRows = VariableNames.Rows.Count

    End Sub


    Private Sub btnOpenCompoundList_Click(ByVal sender As System.Object, ByVal e As System↙
    .EventArgs) Handles btnOpenCompoundList.Click
        Dim OpenDlg As New OpenFileDialog
        With OpenDlg
            .FileName = ""
            .Filter = "Variable Name Files (*.vnf)|*.vnf|All files (*.*)|*.*"
            .FilterIndex = 1
            .CheckFileExists = True
            If .ShowDialog() = DialogResult.Cancel Then Return
            VariableNames.LoadGrid(OpenDlg.FileName, FileFormatEnum.TextComma, False)
        End With
    End Sub

    Private Sub btnSaveCompoundList_Click(ByVal sender As System.Object, ByVal e As System↙
    .EventArgs) Handles btnSaveCompoundList.Click
        Dim SaveAsDlg As New SaveFileDialog
        With SaveAsDlg
            .FileName = ""
            .Filter = "Variable Name Files (*.vnf)|*.vnf|All files (*.*)|*.*"
            .FilterIndex = 1
            If .ShowDialog() = DialogResult.Cancel Then Return
            VariableNames.SaveGrid(SaveAsDlg.FileName, FileFormatEnum.TextComma, False)
        End With
    End Sub

    Private Sub VariableNames_Click(ByVal sender As System.Object, ByVal e As System.      ↙
    EventArgs) Handles VariableNames.Click

    End Sub
    Private Sub btnNameVariablesOK_Click(ByVal sender As System.Object, ByVal e As System.↙
    EventArgs) Handles btnNameVariablesOK.Click
    End Sub

    Private Sub VariableNames_KeyDown(ByVal sender As Object, ByVal e As KeyEventArgs)     ↙
    Handles VariableNames.KeyDown
        Dim copy As Boolean, paste As Boolean, cut As Boolean
        ' ** copy: ctrl-C, ctrl-X, ctrl-ins
        If e.Control Then
            If e.KeyCode = Keys.C Or _
            e.KeyCode = Keys.Insert Then
                copy = True
            End If
            If e.KeyCode = Keys.X Then
                cut = True
            End If
        End If
        ' ** paste: ctrl-V, shift-ins
        If (e.Control = True And e.KeyCode = Keys.V) Or _
        (e.Shift And e.KeyCode = Keys.Insert) Then
            paste = True
        End If
        ' ** copy selection to clipboard
        If copy Then
            Clipboard.SetDataObject(VariableNames.Clip)
        End If
        ' ** cut selection from clipboard
        If cut Then
            Clipboard.SetDataObject(VariableNames.Clip)
            Dim selected As C1.Win.C1FlexGrid.CellRange
            selected = VariableNames.Selection
            selected.Data = Nothing
        End If
        ' ** paste from clipboard
        If paste Then
            ' see of there's text in the clipboard
            Dim data As IDataObject = Clipboard.GetDataObject()
            If data.GetDataPresent(DataFormats.Text) Then
                ' there is, so paste it
                VariableNames.Select(VariableNames.Row, VariableNames.Col, VariableNames. ↙
    Rows.Count - 1, VariableNames.Cols.Count - 1, False)
                VariableNames.Clip = CType(data.GetData(DataFormats.Text), String)
                VariableNames.Select(VariableNames.Row, VariableNames.Col)
            End If
        End If

        'If the user presses the delete key in a cell or in a range of cells, delete them
        If e.KeyCode = Keys.Delete Then
            Dim selected As C1.Win.C1FlexGrid.CellRange
            selected = VariableNames.Selection
            selected.Data = Nothing
        End If
    End Sub


End Class
```